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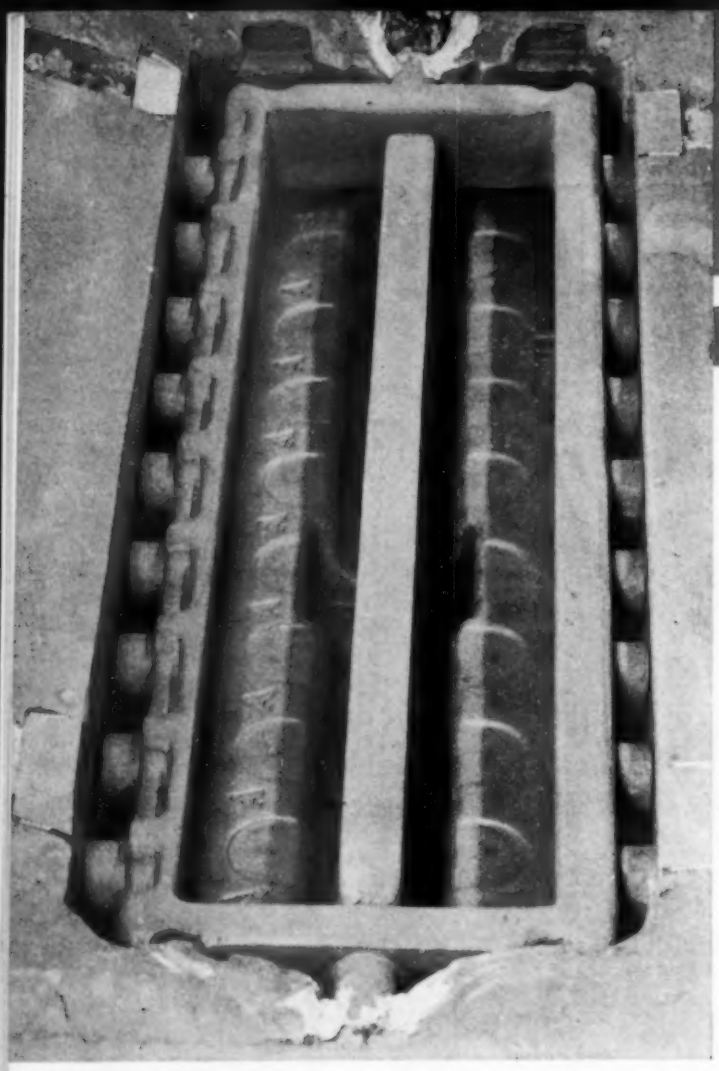

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Casting made in Semi-Steel, poured with top of casting to bottom of mold. Other pictures show drag and cope ready to close. Casting dimensions, 41½" long, 13¾" wide, 7" deep, weight 625 pounds.

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Production Lag Draws Criticism

SHORTAGES of labor, which plagued producers of castings during the final two years of war, have become more accentuated in the early stages of reconversion. As a result, the foundry industry again is being discussed in the public press.

Because castings are basic materials in the manufacture of practically all types of machines and in the production of thousands of items now badly needed by the civilian population, inability of foundrymen, especially those producing gray iron castings, to find sufficient workers to meet present tremendous demands is being heralded by newspapers in industrial centers as a "major reconversion bottleneck." The public is being told "gray iron castings shortages slow factories." Interviews with manufacturers in particular districts tell the housewife that she is not getting her new washing machine or refrigerator because castings are not available in the quantities needed.

Most causes of the present foundry labor situation are of long standing. The industry has not recovered from the wave of unfavorable publicity on foundry working conditions which followed the attempt of certain government agencies to correct a labor shortage created by unwise draft policies for foundry workers. Years of effort and expenditure of considerable money will be needed to eliminate this problem.

Present labor and production difficulties among iron foundries are accentuated by continuance of an unsatisfactory ceiling price policy by OPA which handicaps foundrymen in meeting problems arising from recent inflated wage demands. Gray iron foundrymen point out that the recent 10 per cent price increase in the ceiling price is not sufficient to meet the increase in production costs which have developed during the past three years. At the same time, the increase applies only to prices established during the base period, which was from Aug. 11, 1941 to Feb. 1, 1942.

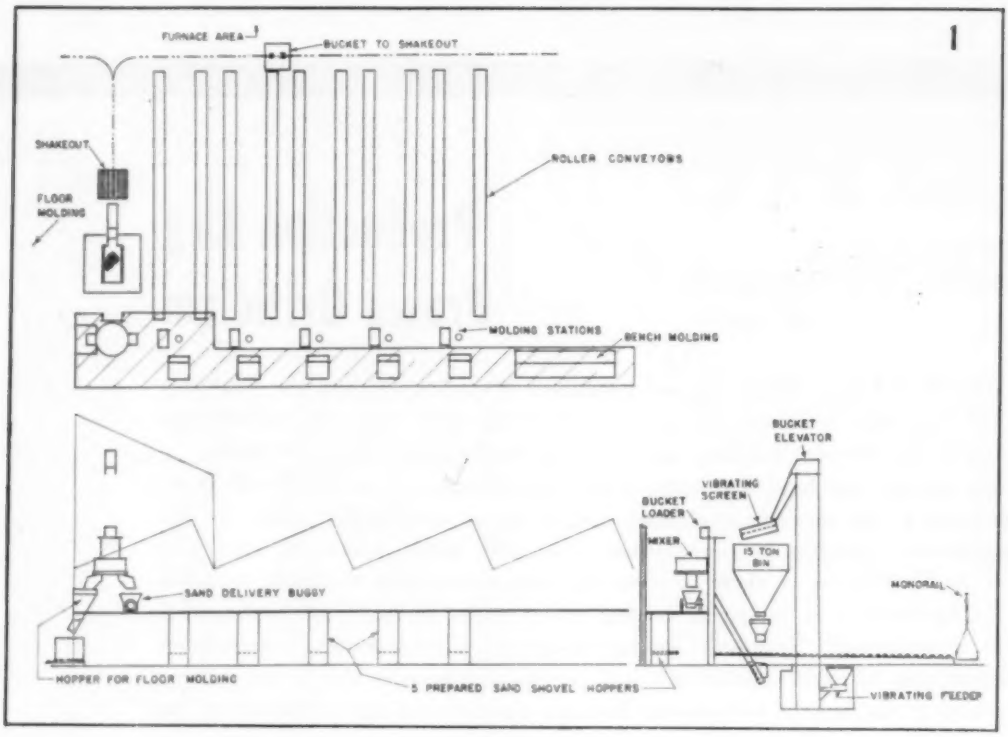
Because ceiling prices on many castings needed for reconversion are below production costs, purchasers of castings frequently find it necessary to locate new sources where the more favorable formula method may be used in establishing prices. Production is being hampered by this migration of patterns, and because of necessity, old producer-customer relationships of long standing are being upset.

THE FOUNDRY believes the following developments are necessary if production of castings for reconversion is to be increased:

1. Establishment of definite wage and labor policy on part of the government.
2. Lifting of OPA ceilings on iron castings.
3. Further acceleration in the trend toward greater mechanization of foundry operations and improvement in working conditions.
4. Increased attention to apprentice and other forms of foundry education by districts and individual companies.

Markets for castings a few years hence may depend on how well today's production problems are solved.

Frank G. Steinebach
Editor



Foundries of the Future

By MAJ. J. B. LAMENZO
United States Public Health Service
and
Connecticut State Department of Health

IN THE foundry industry, we are told, the tremendously increased wartime foundry capacity may produce within the industry competition previously unknown. We also learn that in the postwar period, business success will depend upon the ability of industry to produce more and better products at lower cost.

Regardless of how this question of increased production with better quality and lower cost is approached, the answer in many cases lies in mechanical handling.

Since the average foundry must handle many tons of material to produce one ton of castings, material handling is of utmost importance. The cost of manually handling much of this material is expensive; and with the rising cost of labor, mechanization becomes an economic necessity.

Tied in very closely with material handling is sand conditioning, since foundrymen agree that one of the requisites of improved quality is a uniformly prepared sand.

In addition to the cost of labor and the shortcomings of hand methods of sand preparation, we should also take into consideration how labor is thinking. In 1943, the Medical Research Institute of the United Automobile Workers issued a proposed health and safety section for

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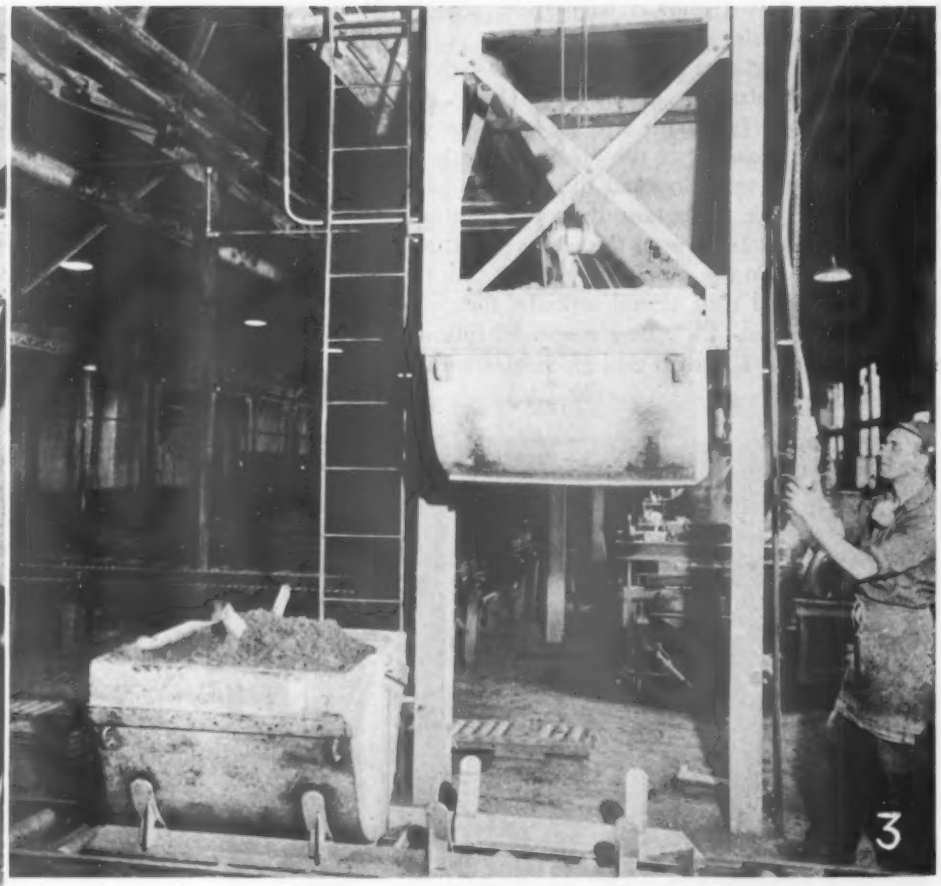
The ideas expressed are entirely the opinions of the author, and the Industrial Hygiene Division of the United States Public Health Service does not necessarily endorse the views or opinions expressed in this article.



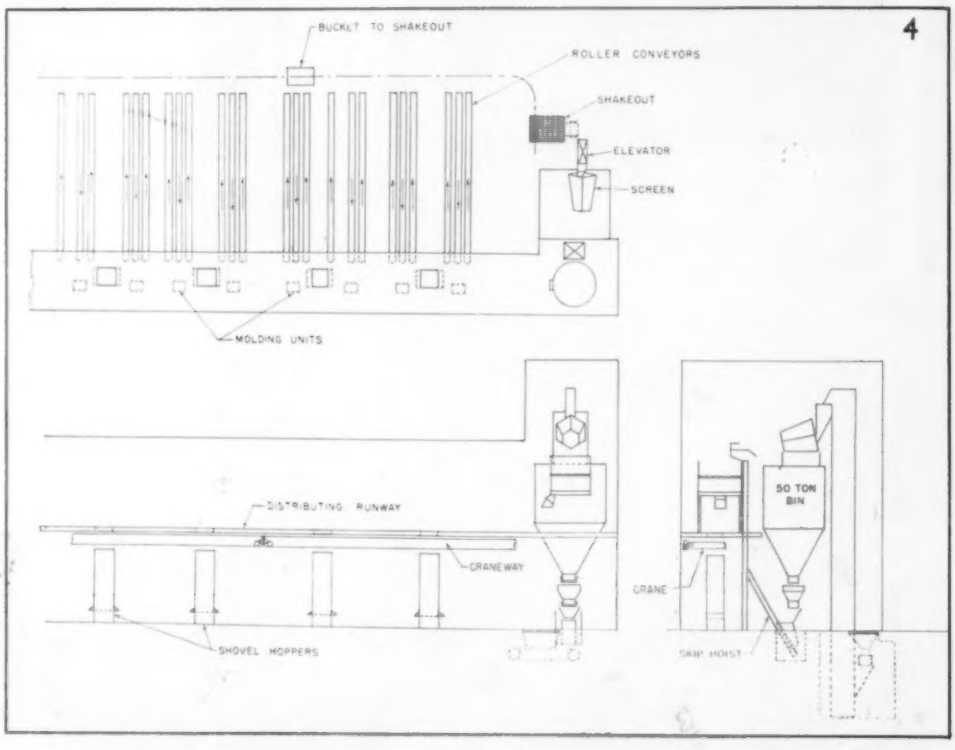


Fig. 1 — This layout of a small foundry is adapted to jobbing as well as production orders

Figs. 2 and 3 — For small foundries a bucket arrangement for conveying sand often is preferable. The unit is controlled by means of a five-button pendant attached to the hoist

Fig. 4 — Layout of jobbing shop making nonferrous castings. Sand handling system serves eight molding stations

union contracts. In the contract, the company agrees to maintain sanitary, safe, and healthful working conditions and to give among other things, pre-employment and periodic physical examinations, including chest x-ray.

The most revolutionary union requirement, however, concerns employees who suffer symptoms due to occupational exposure, even if such exposure is in accordance with accepted standards and no pathological evidence of disease is found. Those employees who suffer or allege to suffer symptoms "shall," the union states, "be transferred to a more suitable environment without reduction in rate." In other words—greater emphasis on what the job *may* do to the individual. Lightening the heavy physical load of the foundry worker may also be an aim of organized labor.

During the past two years, I have spent considerable time with the foundries in Connecticut. The purpose of these visits was to develop ways and means of stimulating interest in mechanization generally. These contacts brought me face to face with two groups—the first, so positive as to be intolerant of the opinions of others, and the second, anxious to understand the opinions of others so as to be better able to appraise their own position.

To the first group, I can issue the warning that to coast is to go downhill. To the second group, by far in the majority, I can say that their liberal attitude, their progressive thinking, will make for a long successful future.

In my discussions, I learned that mechanization was too often considered in terms of almost completely automatic procedures. Although a few mechanized foundries do approach the ultimate in automatic systems, it is best for us to think of the mechanized foundry as semi-automatic.

A few foundrymen expressed fears that their enthusiasm for mechanization might lead them to develop a system too elaborate and, therefore, too expensive. Observing systems in operation served to confuse rather than help some foundrymen decide what best would fit their needs.

When a foundry buys a system of mechanization, engineering advice and planning is included in the purchase price. This is extremely important for small and medium-sized foundries operating without a well staffed engineering department of their own.

We all make mistakes. Even in building a house, we quarrel with the architect if he doesn't include some of our ideas. We just don't feel that he knows best; so mistakes, and costly ones, are made.

A mistake made which often proved cost-

Fig. 5—Molds are brought to the shakeout on trays traveling over a monorail. This system is incorporated in the layout shown in Fig. 10

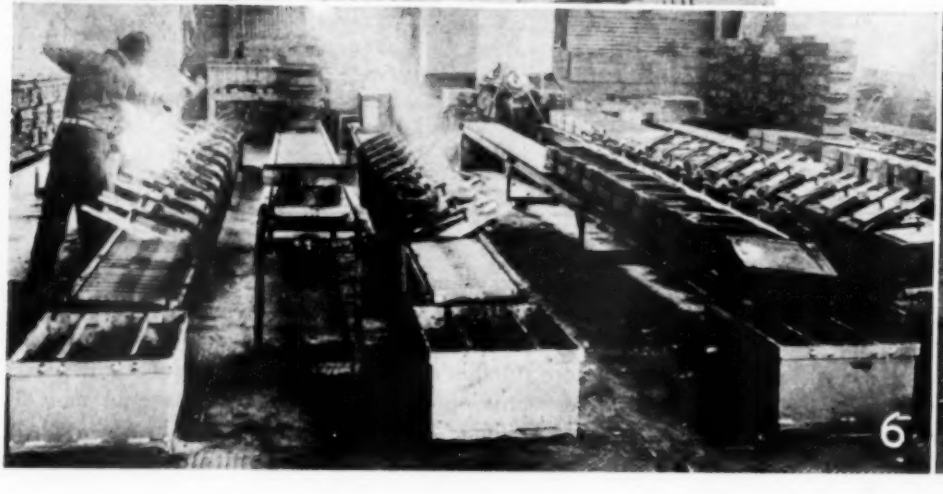
Fig. 6—Showing clamping devices which eliminate shifting weights from one lot of poured molds to another. Locating shakeout at end of each roller conveyor offers some disadvantages. Complete layout shown in Fig. 8

Fig. 7—Furnace area of brass foundry, showing overhead trolley system. Each of six furnaces has capacity of 600 lb per hour

Fig. 8 — Arrangement of sand handling equipment for small brass foundry having ten molding stations

Fig. 9 — Sketches of centralized shakeouts. When possible, exhaust air should be withdrawn through overhead hood covering entire grate, as shown at right

Fig. 10 — Layout particularly adaptable to foundry with large mold production but small tonnage. Roller conveyor system serving molders runs to overhead monorail from which are suspended trays large enough to hold several molds



ly was the use of continuous power conveyors when a conveyor system providing adequate storage was called for. By this statement, I don't mean to convey the thought that continuous power conveyors can't be used. They can, but this type of system has to be very well engineered by reputable people, and the work to be done has to be adaptable to a continuous conveyor system.

In some types of continuous power conveyor systems which I have seen, it was noted that the conveyors were set up to serve too many molders, and this was the result of conflict between what the system was expected to do and the design.

With the continuous power conveyor system the production requirements, the size of castings, the number of pattern changes, and the complexity of the castings all have an important bearing on the number of molders one loop of such a system can serve.

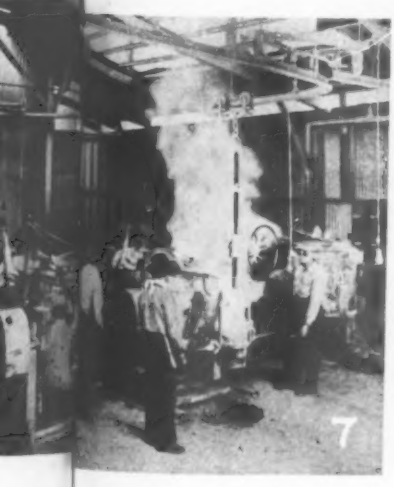
Bear in mind that molders must have empty platens, and if a system is designed for 21 molders when platen space will serve only 12, one can visualize what happens. It is for this reason that some foundry unions insist that each molder shall have a place for his molds on any conveyor system.

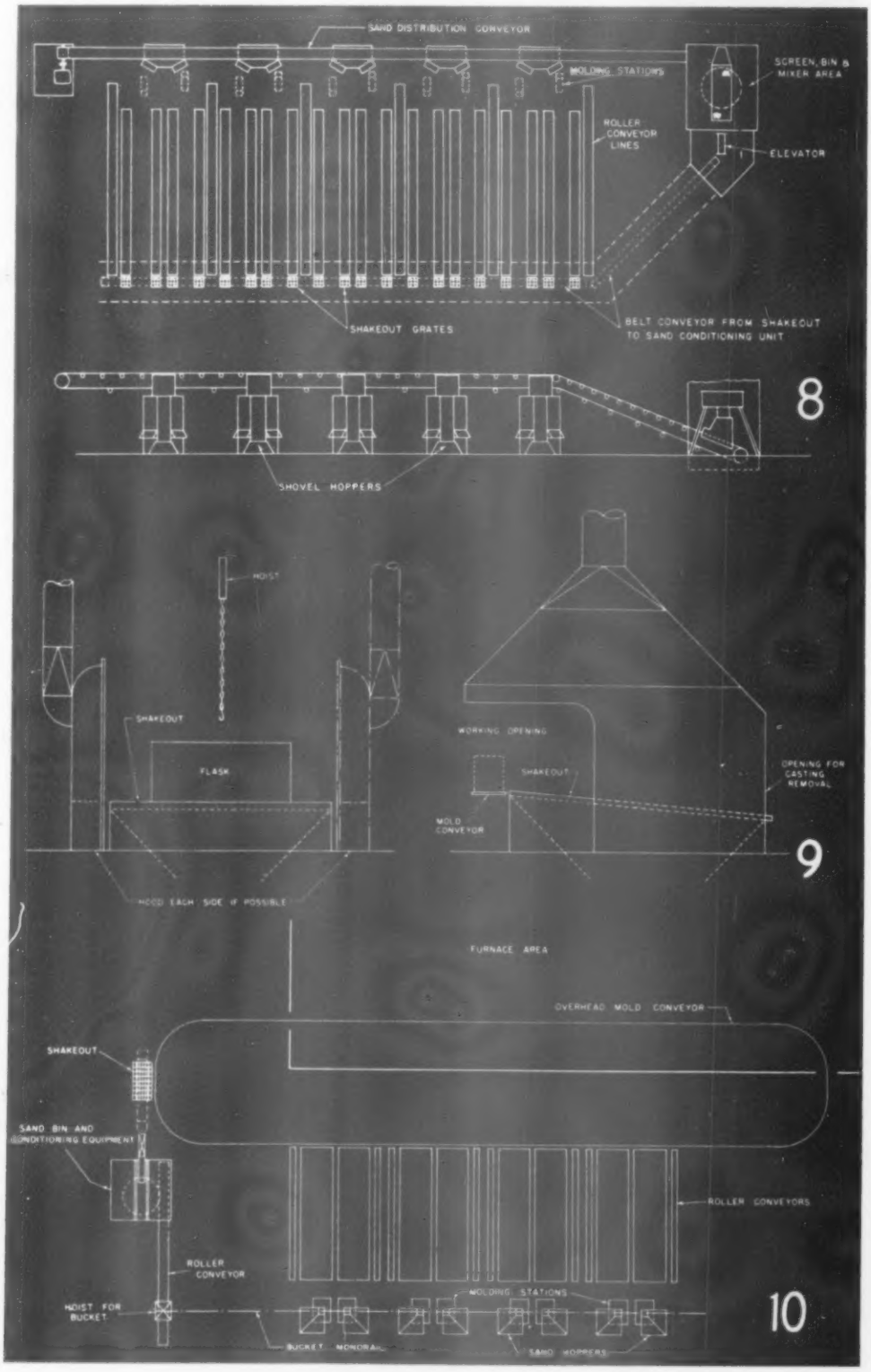
Many times the speeding up of the system to serve more molders results in an increase in scrap losses because proper pouring technique, particularly on light castings, has to be abandoned.

When it is recognized that all systems of mechanization call for the best in engineering, cheapness will never enter into the design and construction of such systems.

A word of warning, at this point, is called for. No foundry can expect equipment engineers to have the foundry turned over to them with these words, "Here is our foundry—now go to it—lay out the mechanization and give us a price." Much preliminary work will have to be done by the foundry itself if the engineering knowledge of the experts is to be utilized to the fullest.

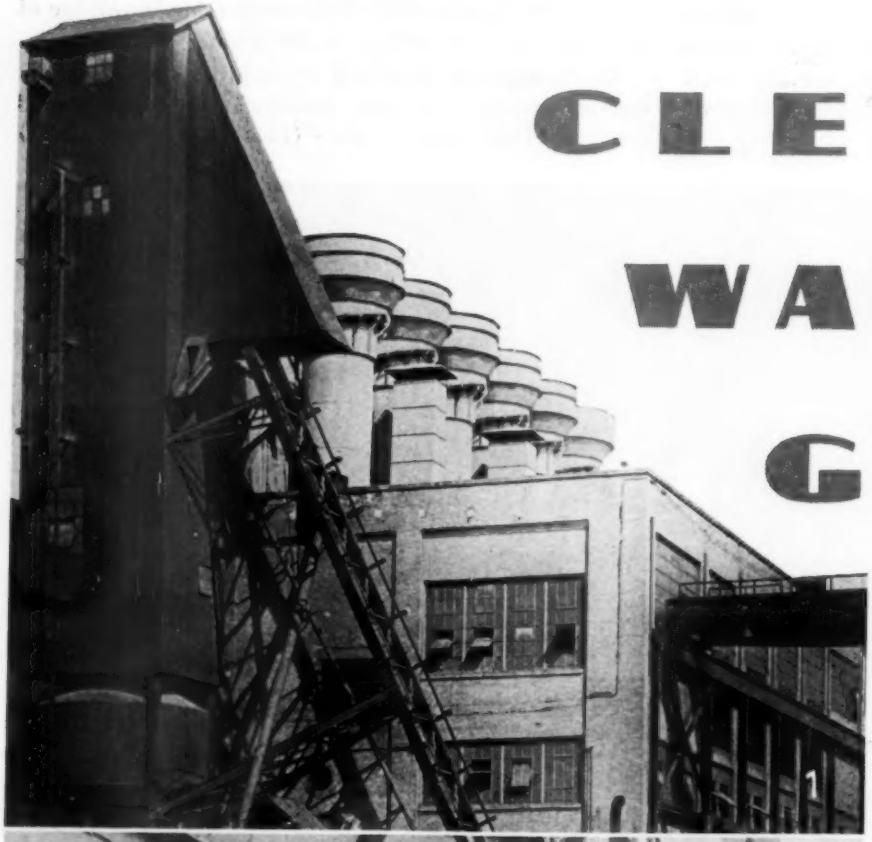
To eliminate the possibility of confusion, study your requirements—lay out your foundry with the proposed changes. Don't concern your- (*Please turn to page* 238)





Collectors on Cupolas CLEAN WASTE GASES

By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY



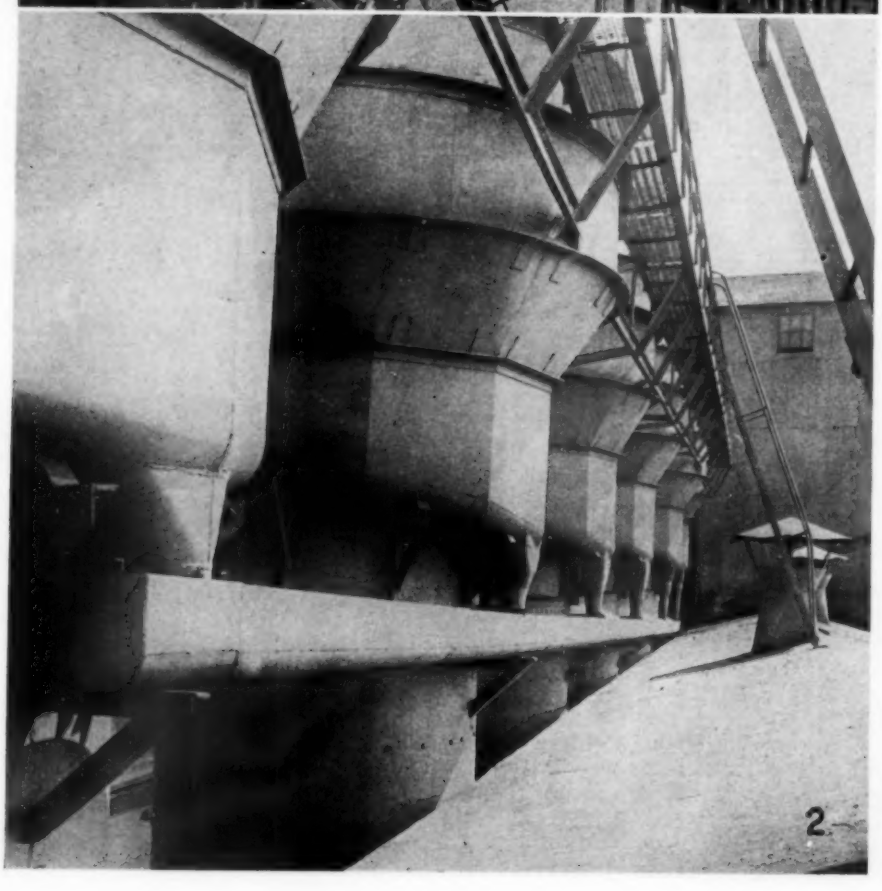


Fig. 1—Ground view of dust arresters, with foundry building in foreground. Inclined pipe from top of building carries sludge draining from arresters to settling tank. A-frame structure in foreground is part of cupola charging system

Fig. 2—Closeup of dust arresters from roof of foundry building, directly under catwalk. Note trough for carrying off drainage from all six arresters

Fig. 3—Cross section through complete dust arrester unit, showing simplified construction and assembly system. Note catwalk, railing and support at left

Fig. 4—Elevation view of six dust arresters from inner side, showing how all units are tied together

REMOVAL of solid particles, such as iron oxides, coke breeze, ash and limestone dust, from waste gases emerging from gray iron cupola stacks is not only a matter of good foundry housekeeping but also a precaution which can pay dividends in safety, improved cupola efficiency and worker morale. It has received all too little attention, although various types of dust arresters for installation atop cupola stacks have been designed.

Shortly before the cessation of automobile production in 1942 forced the shutdown of its gray iron foundry, foundry personnel of the Buick Motor Division, Flint, Mich., under the supervision of the late B. H. Newell and the present foundry superintendent, W. G. Mixer, decided to take action on cupola dust arresting in the form of a simplified collector which they had designed. Designs were turned over to an outside contractor for construction and installation on No. 1 cupola of the battery of six operated at the foundry. The unit was installed in August, 1941, but precipitate shutdown of the foundry prevented completion of the program.

Arresters Gradually Placed in Service

In advance of the reopening of the foundry last summer on a limited production schedule to supply gray iron castings for the Hercules JXD engine, two cupolas were equipped with arresters and the remaining three were completed this year. The last five were fitted with a slightly modified design but operate on the same basic principle, and the six collectors are now tied into a unified installation with centralized controls, inspection platform, etc. The Hercules program called for operation of only one cupola, but now that full-scale automobile production is being resumed gradually, others in the battery will be operated and a full appreciation of the advantages of the dust collectors can be gained.

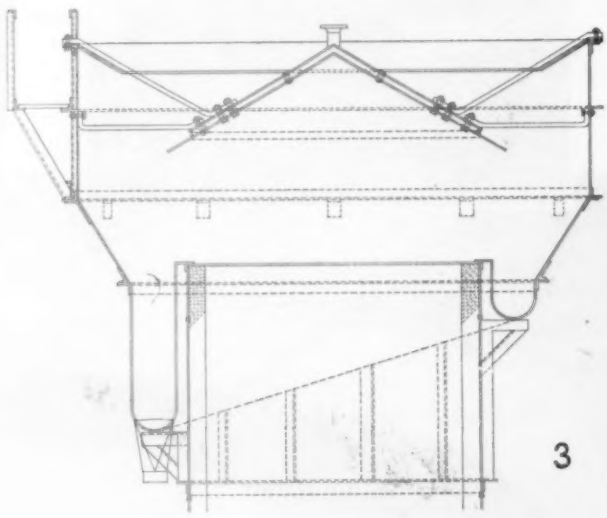
A description of one of the collector units will show its construction and operation. The stack is 40 ft high, from tuyeres to top, with 8 ft outside diameter, and the collector is set squarely on top, extending 5 ft 10 in. above the top line. An assembly of ¼-in. steel plate, structural sections and tie rods, bolted and welded together, it comprises an outer cylindrical shell 14 ft in diameter and about 4 ft deep; the shell then tapers in to 11-ft diameter for a depth of about 2 ft to bring it to the top of the stack. Below this point there is a slanting trough a little over 1 ft in width, and 1 ft deep at the outer or shallow side, dropping to 4 ft deep at the inner or deep side.

Additional support for the shell and trough is provided by a series of 12 angle-iron vertical brackets bearing directly against the bottom of the trough and electric welded to the cupola shell. These in turn are provided extra support by a 4x4-in. angle iron belt welded circumferentially to the cupola at a point about 15 in. below the deepest or inside portion of the trough. Lower ends of the aforementioned brackets are welded to this angle ring.

Within the top portion of the shell, two sets of twelve 1½-in. bolted radial tierods are supported by a double-wall conical canopy 9 ft in diameter positioned exactly in the center of the shell and directly over the top of the stack.

The lower plate of this canopy, of ⅜-in. steel, extends about 8 in. beyond the upper ¼-in. plate and is separated from it by 1 in. through the use of 1-in. pipe spacers welded to the lower plate so it will be watertight. Support rod bolts pass through these spacers. Apex angle of this is 120°. At the periphery of the upper plate of the canopy, there is welded between it and the lower plate a ½-in. spray nozzle ring 2 in. in width. In this ring are tapped a series of ¾-inch holes every 4 in. These holes are alternated between two on a line ¾-in. from the upper edge of the ring and two on a line ¾-in. from the lower edge. Diameter of the spray nozzle ring is 8 ft.

Into every other hole is fitted a nozzle comprising a 2-in. section of 1-in. pipe, at the outer end of which is sawed a ⅛-in. slot at an angle of about 45°. The nozzles are screwed into the ring until the slot extends downward, serving to direct water from it in a fan-shaped spray. Thus there are 38 equispaced nozzles around the ring, each emitting a fan-shaped spray of water with sufficient force to strike the outer edge of the collector shell and then drain into the previously mentioned trough.



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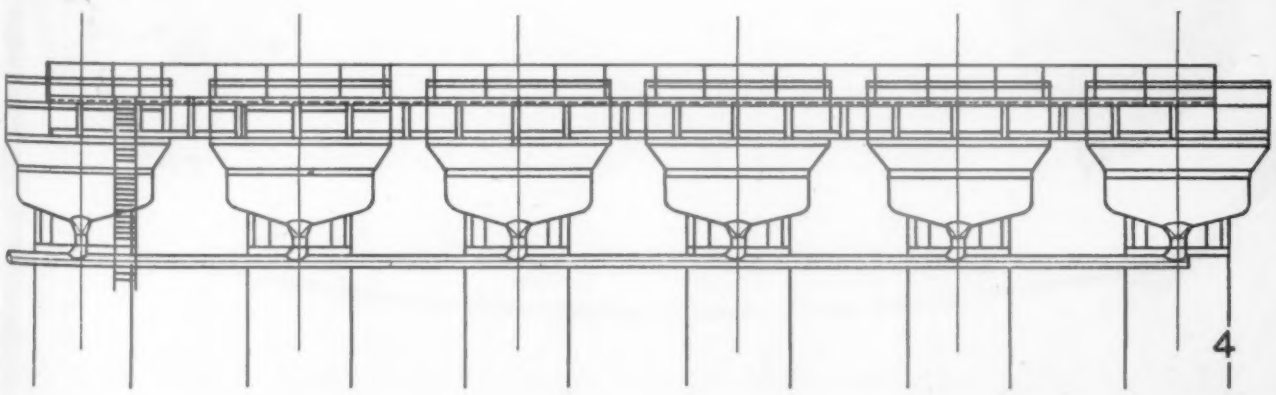

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Water is brought into the canopy through a 3-in. pipe welded into its apex. It follows down the space between the two plates of the canopy and out the spray nozzles, providing a more or less continuous curtain of the water between the edge of the canopy and the inside of the shell.

Briefly, the theory of the collector's action is that gases from the cupola stack rise until they strike the underside of the canopy, then reverse direction and curl over the edge of the lower plate up through the water spray which both removes most solid particles from the gases which have been appreciably slowed in velocity, and cools them as well. Emerging from the water curtain, the gases drift lazily into the atmosphere above. Meanwhile the water and its entrapped solid matter drains down the slanting trough and empties into a lateral drain serving the troughs on all six cupolas. The latter is slanted downward somewhat from the first cupola to the last so that the water will flow readily to the lower end and out into a sludge tank.

The simplicity of the construction can be appreciated from the fact there are no moving parts or any complicated machined components, being basically welded structural steel and plate. Sole activating medium is water, which is supplied from a central pumping station to all six collectors from a surge tank located at the blower deck level, or halfway between the ground and the charging platform level. The single pump delivers water from the tank at 75 lb pressure to each collector (*Please turn to Page 199*)

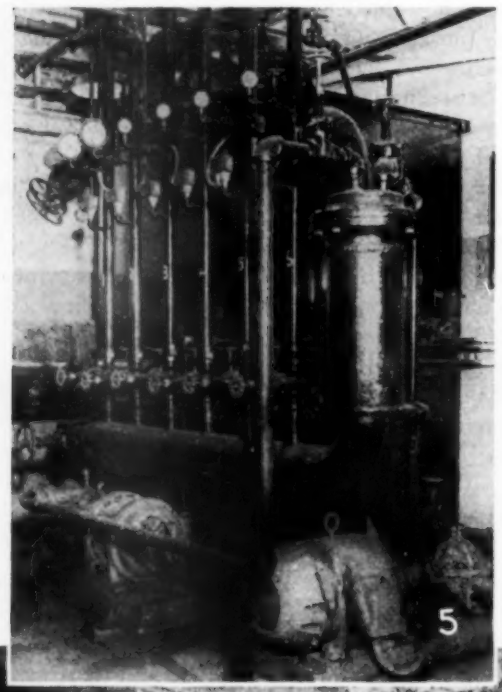


Fig. 5—Central water pumping station and surge tank, with individual lines going to each dust arrester. Note relays just below pressure gages on each line which lock out power to blowers unless water is flowing into arresters

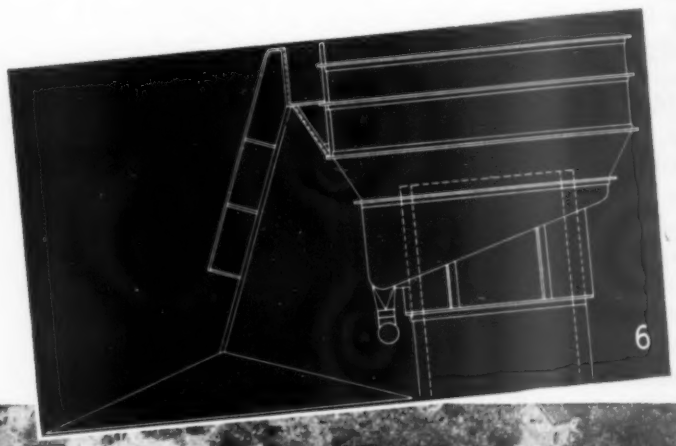


Fig. 6—Side view of dust arrester, disclosing its position in relation to roof of foundry building and ladder giving access to walkway

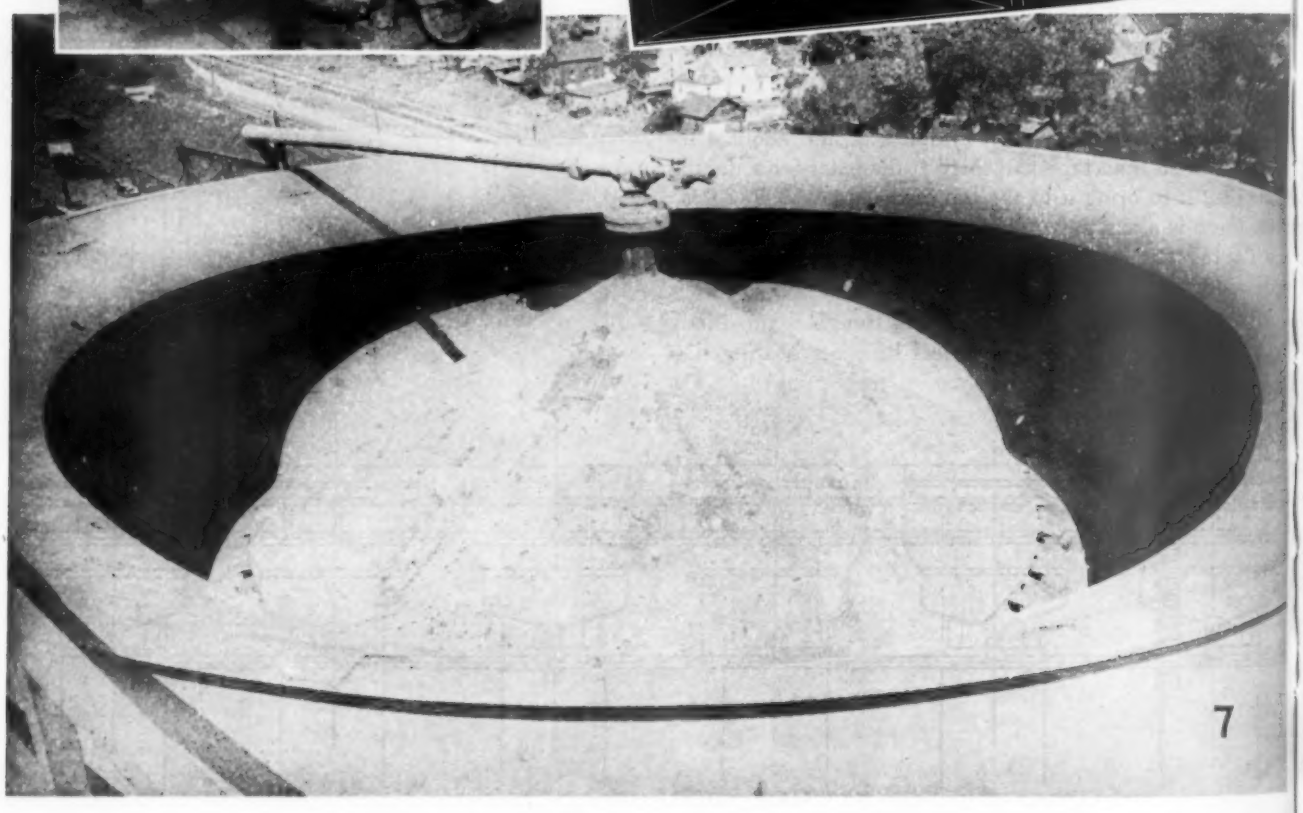


Fig. 7—Looking into top of arrester on No. 1 cupola, showing conical canopy and several spray nozzles at its lower edge. Design of other five arresters was modified to include radial support bars

Physical Testing of core binding materials

By CARL E. SCHUBERT
Associate Professor of Mechanical Engineering
University of Illinois, Urbana, Ill.

BECAUSE of the advancements made in the manufacturing and processing of core oils in the past 10 to 15 years, old standards of testing core oils for foundry use have become obsolete. An example of that is the chemical test, called the iodine number test of vegetable oils. Originally, it was thought that, because this test measured the vegetable oil's ability to oxidize in the core oven, it also was a measure of the quantity and kind of vegetable oil in the core oil. Because some vegetable oils, and such materials like petroleum polymers, have almost identical numbers, this attempt to measure the quality of a core oil had to be discarded.

Physical testing of core oils and core binding materials has been substituted for the chemical tests. They, like the chemical tests, are not ideal, but have proven that when performed correctly, they do help the manufacturer of core oils to produce even stronger core binders at less cost to the buyer. They also help the purchaser because they act as a check on the quality and uniformity of the core oil being purchased.

Objective: The objective of the herein outlined physical tests of core binding materials is to provide suitable tests for both seller and purchaser so that quality and uniformity can both be maintained by the producer and be checked by the buyer of the material.

Kinds of Physical Tests: The principal physical tests developed to measure the quality and uniformity of core binding materials are as follows: Tensile strength test at room temperature, tensile strength test at 250 F, amount of gas given off by the binder, and the per cent loss in strength of the core binder when subjected to an atmosphere of relatively high humidity.

Variables: Many difficulties are encountered when physical tests are performed on core binders. Some of these are due to the many variables encountered by the operator, and some are due to faulty technique. An effort will be made in this outline to eliminate the many variables and to caution the operator on faulty technique.

Testing Equipment: The first prerequisite in performing a satisfactory tensile strength test of core binding materials is, of course, good testing equipment. This equipment should include a sand muller, good circulating thermostatically controlled baking oven, standard AFA rammer, corebox, testing machine, and such minor equipment as core plates, pliers, balance, etc.

Kind of Sand: Of second importance is the selection of the kind of core sand to be used by the company purchasing the core binder. This sand should be, insofar as possible, the same sand as used in the coreroom to produce cores.

Core Sand Mixtures: In the order of next importance is the selection of the core sand mixture. This mixture should be a simple one consistent with the idea of measuring the strength of the core binding material. In other words, a straight silica sand, core binding material, and water mixture is to be preferred to a more complicated formula because the binding material's true strength is more readily measured under conditions of simplicity, rather than complexity. Of course, if one is interested in measuring the ability of a core binder to withstand being absorbed by clay binders, it is permissible then to introduce clay binders in the core sand mixture. But so far as general practice is concerned, one will find that all core oils will be absorbed by clay binders.

Baking Temperature: The next important consideration is the selection of the baking temperature to be employed by the operator. This should correspond to the temperature being used in the coreroom. However, it cannot be stressed too much that cores should never be baked above 450 F. This is because all vegetable oils used in the processing of core oils *break* at temperatures above 450 F. Most laboratories, therefore, use 400°, 425°, or 450° for baking core oils. Of course, the magnesium industry sometimes employs 300 to 350 F to bake their test samples.

Length of Time: After the baking temperature has been selected, the length of time the cores are to be baked must be agreed upon. It is good practice to vary the time over a certain number of periods in order that a suitable graph of the performance of the core binder can be made. This graph will show the binder's ability to oxidize readily and will also show its ability to withstand longer periods of baking. It is, therefore, a gage of the oil's performance.

Mixing Sand: The mixing of the core sand mixtures should follow a definite procedure. Usual practice is to mix the core sand and water for two minutes; then add the core oil, and mix for five minutes—total mixing time—seven minutes. However, if cereal binders, clay, molding sand, silica flour, etc., are used in the sand mixture, these should be mixed dry with the silica sand for two minutes; then water is added, as before. Total mixing time should then be nine minutes.

Ramming: Standard AFA procedure should be used in making the test cores with the exception of ramming the cores. As ramming can be of utmost importance in the uniformity of test results, it has been recently decided that test cores should be rammed a minimum of ten times for straight oil, sand, and water. (*Please turn to page* 192)

FUTURE OF THE BRITISH *Light*

Some of the problems facing aluminum and magnesium foundries of the United States find their counterpart in this discussion of the outlook in the British light alloy foundry industry. The article is from the eighth Edward Williams Lecture, presented at the annual general meeting of the Institute of British Foundrymen, June 16

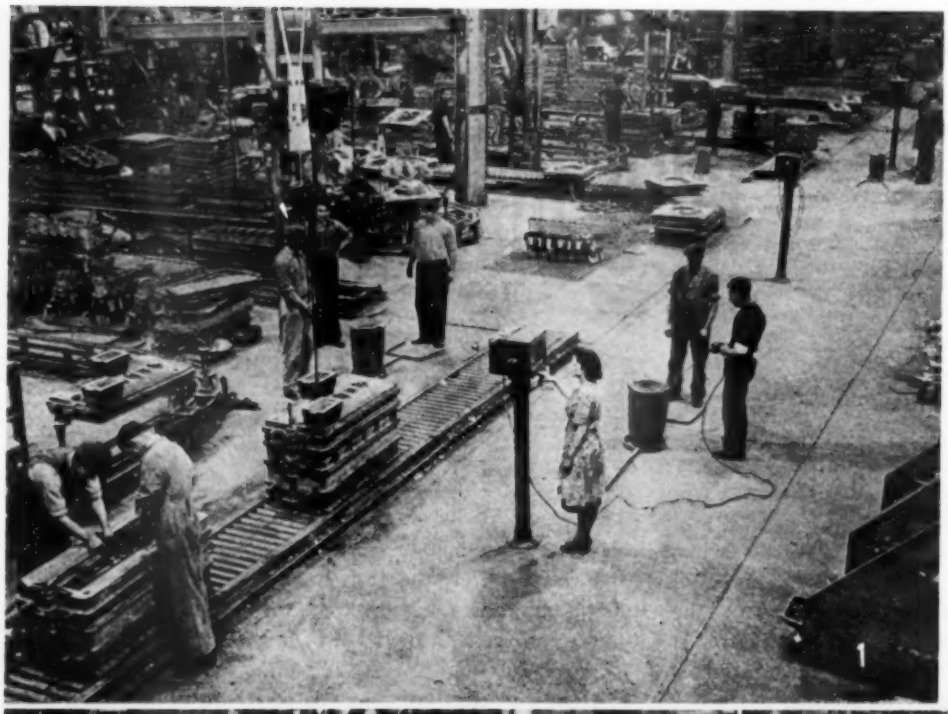


Fig. 1 — Section of Rolls Royce sand foundry, showing layout of molding machines and conveyors. Note line of pyrometers mounted along the floor

Fig. 2 — Inspection line of Great Britain's first fully mechanized gravity die casting plant

Fig. 3 — Molding and core assembly of top half of Merlin crankcase in the sand foundry

Fig. 4—Production line in gravity die casting plant, showing operators working from "bale out" type furnace to gravity die. Power driven pallet conveyor removes castings to subsequent operations of finishing, inspection and heat treating

Alloy Foundry Industry

By W. C. DEVEREAUX
Chairman and Managing Director
High Duty Alloys Ltd.
Managing Director
Magnesium Castings & Products Ltd.

DURING the war we in the light alloy foundry industry, in common with all other British industries, have seen how productivity can be increased by long-range planning and by the enthusiastic co-operation of management and labor in pursuit of a clear-cut objective.

I believe that these two factors must be continued after the war. We must somehow arouse in the people the realization of the paramount importance of increased productivity, of the fact that on it will depend not only full employment and social security but also the maintenance of our position as a leading industrial country and even the way of life of the individual citizen.

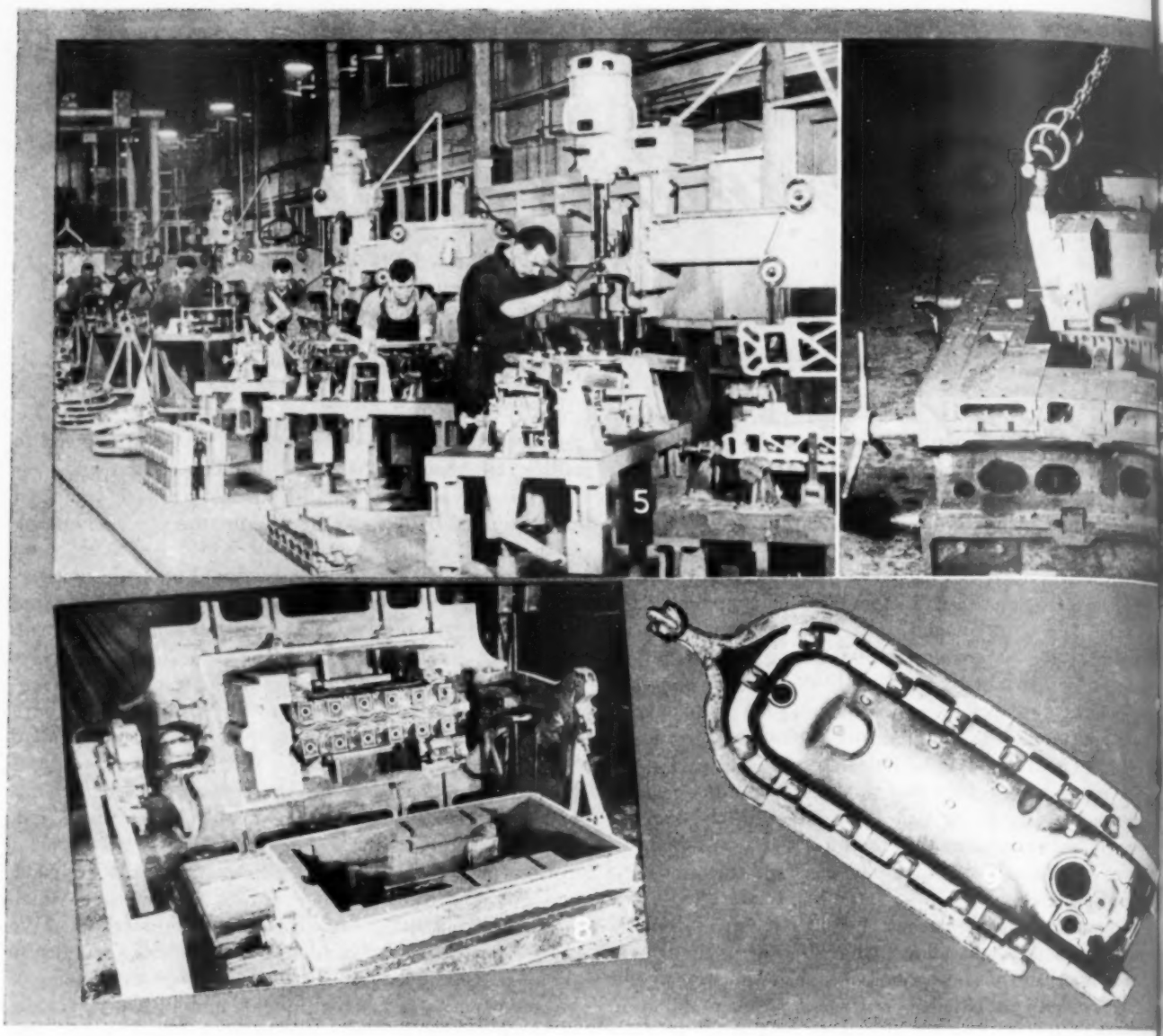
We must also see to it that production is stimulated by long-range planning; by that I do not mean the bureaucratic control of industry, but the formulation of broad objectives which will spread confidence and secure continuity of production.

Without being complacent, I can say, after studying conditions in the light alloy foundry industries both here and in America, that our principal high production foundries are at least as efficient as their opposite numbers in the United States. I must emphasize, however, that their efficiency is proportional to the extent to which they can rely on orders for sufficient numbers of casting to enable them to construct first-class patterns, dies, and jigs and to utilize fully their machines and handling equipment.

These very efficient foundries which we have organized and equipped by our sacrifices during the war should rank as important capital assets in our national economy; and it is essential that a careful study should be made to ascertain how they will fit into our postwar industrial structure in order that the most efficient of them, if not all of them, shall remain intact. By that I do not mean only the plant and machinery, but also the fine teams of managers, technicians and craftsmen who, by their achievements, have shown their ability to organize and to improve the quantity and quality of output.

It must be conceded, of course, that the requirements of a peacetime economy will probably be far more complex than those of a war economy. There will be a far greater variety of capital and consumer goods to be made, and many of these will be required in quantities which will not permit the use of mass production methods. We must expect, therefore, a revival of the jobbing foundry to produce these goods in short runs. The actual balance between man and machine in this jobbing work will depend very largely on the numbers of young people who will enter the industry to learn its crafts and practices.

At this stage I would like to tell of a few of the achieve-



ments of the light alloy foundry industry during the war so as to provide a background for my remarks on the future prospects of this industry.

Output of aluminium castings in the period 1924 to 1933 remained fairly steady at roughly 10,000 tons a year. In 1934-35 a 50 per cent increase in output brought this figure to 15,600 tons, according to the fifth Census of Production. Output rose at an increasing rate from that time on until the outbreak of war brought about a rapid expansion which at a very conservative estimate reached about 28,000 tons in 1940, 32,000 tons in 1941, 46,000 tons in 1942, and a peak of 57,000-60,000 tons in 1943-44.

A very rough estimate of the structure of the industry at this peak output stage would give about 25,000 tons as the output of three firms producing over 5000 tons a year each, about 15,000-16,000 tons as the output of seven or eight firms producing between 1000 and 5000 tons a year, and roughly 20,000 tons as the total output of somewhat less than 600 firms each producing less than 1000 tons of castings a year.

The magnesium casting industry in this country is of more recent origin but, according to recently released figures, (*Foundry Trade Journal*, April 9, 1944) output reached 400 tons by 1936. The war brought about an expansion in the production of magnesium even more spectacular in proportion than in the production of aluminium castings. The production of die cast incendiary bombs at a peak rate of 4,327,000 castings per month accounted for a large proportion of this output. These and other castings must have accounted for the bulk of the 23,000 tons of magnesium which were produced in 1943, to say nothing of the supplies imported at this time.

A significant feature of recent years has been the increasing size of castings ordered in both aluminium and magnesium base alloys, but it is not in the direction of large castings that the future "bread and butter" lines of the industry lies. It must be remembered that the bulk of the equipment now available and with which we shall have to carry on the next few years is designed chiefly for the producing of aircraft parts; that is, mainly for small and medium sized castings. Such equipment is well suited to the quantity production of equipment, fittings and furnishings for the rehousing program, for automobile construction, etc. Equipment capable of handling larger castings will be an asset for the shipbuilding, railway, and mechanical engineering fields.

I imagine that the light alloy foundry industry would make an interesting field for study of the industrial econ-

Fig. 5—Jig and spot location of castings. This eliminates "marking out" of castings in machine shop, enabling them to be placed directly in machining jigs

Fig. 6—Die for casting bottom half crankcase of Rolls Royce Merlin engine

Fig. 7—Making the intricate cylinder head core. A girl can turn out 30 cores per shift compared with 6 by a man using hand method. Finished core shown on table at right

Fig. 8—Close-up view of top half crankcase molding machine in pattern withdrawal position

Fig. 9—Bottom half crankcase casting for Merlin engine as removed from die with runners and riser attached

omists. It is a most complicated structure composed of a wide range of units from the very large firms and groups of firms down to the very smallest possible industrial unit.

Among the larger firms, i.e. those with an output of between 8000 and 10,000 and more tons per annum, no optimum pattern can be found. One large group consists of several foundries making castings of aluminium, magnesium, iron, foundry equipment and wrought light alloy products. Another very large group of foundries is part of a much larger organization whose principal interest lies in the manufacture of aero engines and motor cars. Yet another organization is devoted entirely to the manufacture of light alloy castings, while others are concerned equally with the manufacture of wrought light alloys.

If this is complicated then the structure of the smaller foundries is even more so. They range from the jobbing foundry of a large general engineering concern through a variety of foundries devoted entirely to the business of casting light alloys, to the highly specialized foundries producing nothing but die cast aluminium pistons.

With such a complex industry to deal with it is well nigh impossible to make any forecast of a general nature which could hold for anything but a particular kind of firm in the industry. With so many foundries occupying a position in some firms of relative subordinance to other manufacturing processes and dependent for their well-being upon the general success of the other activities, it is difficult even to define what is and what is not to be included in the light alloy foundry industry.

I understand that there are more than 600 aluminium foundries in the country, and yet about 70 per cent of the total output of aluminium castings comes from about a dozen firms.

Owing to the much more complex processes involved in casting magnesium alloys their branch of the industry naturally tends to be more compact, since the casting of magnesium necessitates far more rigid technical control and expensive and elaborate equipment.

For these and other reasons I have found it necessary to confine most of my remarks to conditions as they apply to the larger units of the industry, although much that concerns these large foundries will apply to the smaller units as well.

It would be impossible here to give anything like a complete picture of the ways in which the light alloy industry has achieved its great wartime expansion. All I can do is to show a few pictures to illustrate how mechanization has been employed to achieve (*Please turn to page* 146)

Gray Iron Production FOR WAR

By JAMES S. VANICK
Metallurgist
International Nickel Co. Inc., New York

I HAVE chosen to write this review in a conversational style as though I were exchanging experiences with some of my French friends in the industry. With the advent of the war, communications stopped and at about that time this review begins. An industry unprepared for war hastened to convert its men, materials and machines into the products for war.

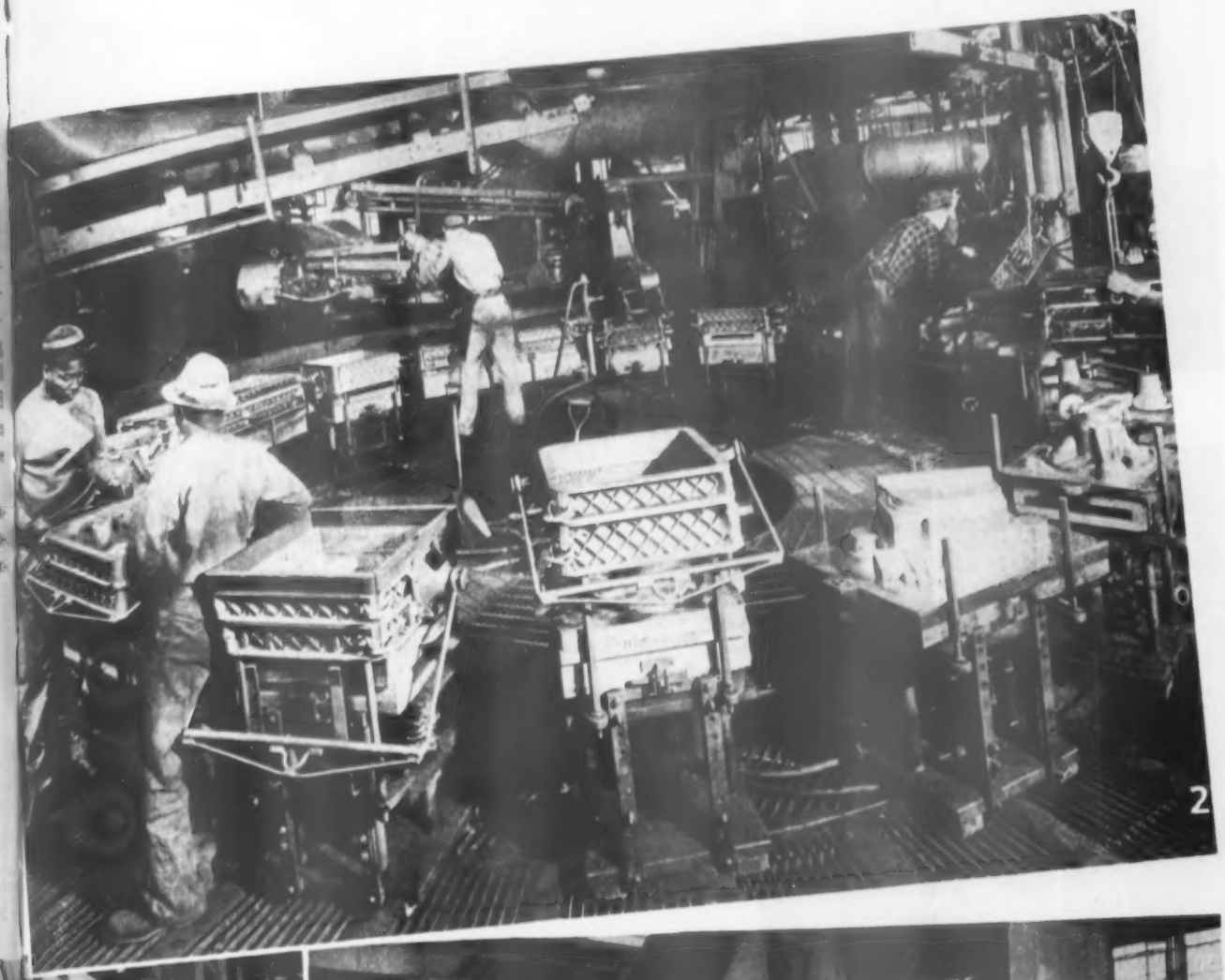
Some gray iron foundries converted completely to the production of aluminum and lightweight alloy castings. The aircraft production program called for multiplying the output of lightweight alloys by approximately 10, and a corresponding increase in lightweight alloy casting production followed. The foundry industry was also warned that steel would be needed in unprecedented quantities. Steel casting production trebled in quantity. Gray iron production, which had steadily increased up to the opening of the war, increased moderately but shifted in character. With these changes in the industry there was a corresponding migration of skills from one class of work to the next.

In the gray iron industry, production shifted to the manufacture of engine castings, naval and army equipment and munitions. In the course of this change, civilian castings such as automotive, stove and furnace, enamelware, pipe and water works castings became a casualty almost as completely as if the country had been invaded and its production stopped. The facilities for production were converted to the manufacture of bombs, shells, grenades, etc., while pipe shops which were expert at centrifugal casting, applied their skill to the manufacture of guns, hollow shafts, aircraft cylinders and similar necessary equipment. Some of the most interesting accounts of technical achievements in these fields will emerge in time in the technical press. A slogan was used which found its way into many foundries and stirred its readers—"The improbable we will do immediately; the impossible will take a little longer."

As in any similar emergency, a shortage of men, materials and machines accompanied the conversion and production problem. The War Production Board was or-

Fig. 1—Carousel system of molding. Sand for the operation comes from overhead bin. Surplus sand falls through floor grating for reprocessing. Fig. 2—Turntable accommodates molding of eight copes and eight drags during each revolution. Fig. 3—Typical conveyor line molding. Sand from overhead hoppers is delivered to molding machines whose tables approximate height of conveyor trays, thus facilitating transfer. Fig. 4—Carrying its supply of molding sand, this sandslinger rams molds on either side of track on which it travels

How the gray iron foundry industry of the United States adjusted itself in the shift from civilian to military castings is effectively portrayed by the author in his discussion of leading wartime developments in operating practice. The paper was prepared for presentation at the first postwar congress of the French Foundry Association in Paris, Oct. 19-20



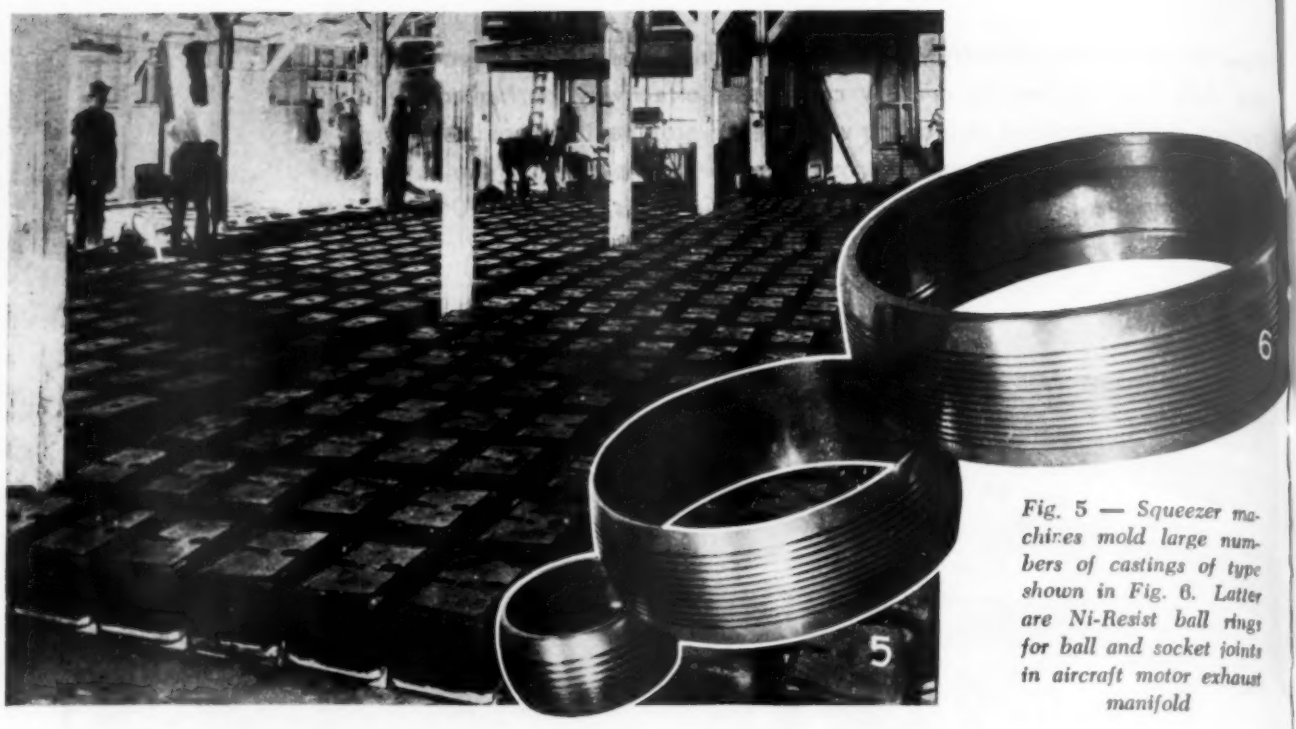


Fig. 5 — Squeezer machines mold large numbers of castings of type shown in Fig. 6. Latter are Ni-Resist ball rings for ball and socket joints in aircraft motor exhaust manifold

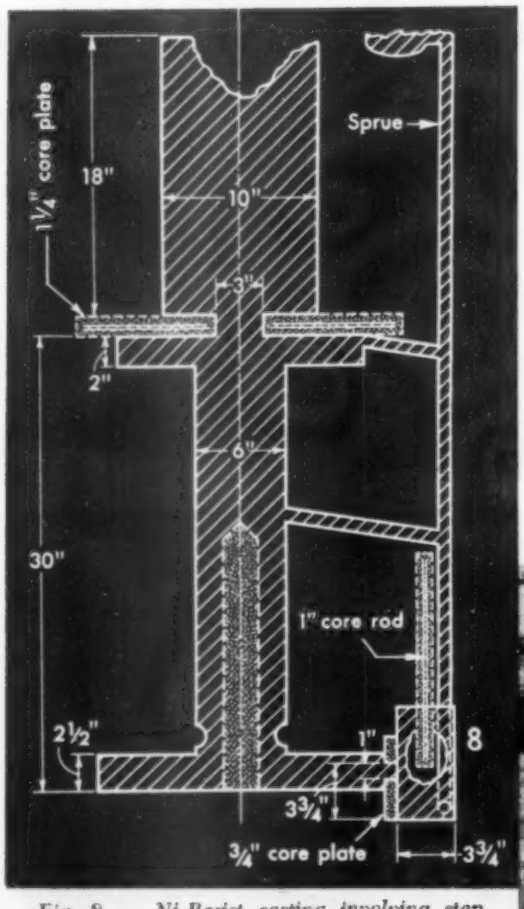


Fig. 8 — Ni-Resist casting involving step gates, Williams riser (atmospheric pressure supplied by 1-in. core rod), gating through riser and knockoff risers. Note relative dimensions and design of risers, riser connections and gating system. Freezing may be traced from thinnest sections and coldest metal to heaviest section and hottest metal in risers

TABLE I—Some Typical Analyses of Ladle Inoculants

Inoculant	Composition, Per Cent						
	C	Ca	Cr	Mn	Si	Ti	Zr
Ca-Metal	.....	100*	.....	.....	.....	.....	.....
Ca-Si	.....	30-35	.....	.....	60-65	.....	.....
Ca-Si-Ti	.....	5-8	.....	.....	45-50	9-11	.....
Cr-Si-Mn-Ti-Ca	.....	1*	38-42	8-11	14-16	1*	.....
	.....	1*	28-32	14-16	15-21	1*	.....
Cr-Si-Mn-Zr (3 Grades)	.....	.....	30-52	5-10	14-35	.....	1-4
Fe-Si	Refer to Table 94, page 231, *Alloy Cast Irons*, AFA***						
Graphite	90-100	.....	.....	.....	.....	.....	.....
Me-Si**	.....	.....	.....	.....	30*	.....	.....
Ni-Si†	.....	.....	.....	.....	30	.....	.....
Si-C	28-46	.....	.....	.....	45-56	.....	.....
	50	.....	.....	.....	42*	.....	.....
Si-Mn	.....	.....	.....	20-25	47-54	.....	.....
Si-Mn-Zr	.....	.....	.....	5-7	60-65	.....	5-7
Si-Ti	.....	.....	.....	.....	20-25	20-27	.....
Si-Zr	.....	.....	.....	.....	47-52	.....	35-40
	.....	.....	.....	.....	39-43	.....	12-15

*Approximate, **60% Mo, †60% Ni.

***Several grades containing 50 to 90% Si; also silvery pig iron (6 to 20% Si) and special iron with 5 to 15% Si.

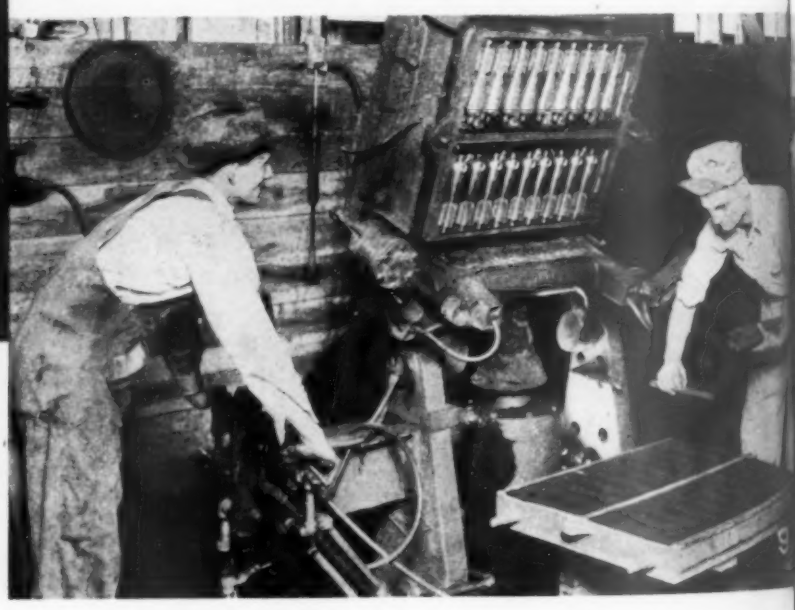


Fig. 7—Cross section of typical centrifuse brake drum showing steel-backed high carbon nickel-chromium-molybdenum alloyed cast iron braking surface

ganized and staffed with able men taken from industry. These men were equipped from their own experience with statistics upon the capacity of industry and they set out to allocate materials and machines in amounts proportional to the manpower available.

In an effort to "hold the line" on the cost of commodities, the Office of Price Administration was created, and foundrymen were faced with an acute need to place their cost accounting methods under the cold appraisal of government officials who were not interested in profits. From this experience, much good will follow. Many foundrymen learned about the treachery of hidden costs concealed in their earlier and less exacting methods of doing business. Each producer filed a standard method for computing costs which he was compelled to maintain.

This element of conversion brought with it considerable difficulty, particularly as shops moved from an operating schedule of 40 to 48 hours per week to 70 hours per week and operated two shifts or the necessary multiples to keep in production day and night. These changes brought with them overtime pay and wage incentives which added to the problem of cost accounting and made survival more impressive. Some foundries completely converted their practices and production in the course of this interval, while others gave up in the same time through inability to obtain men or materials or to operate at a profit.

Government authorities took charge of raw materials and, through the allocation system, controlled the production of castings. Certain foundry products such as sand and fuel were in comparatively abundant supply, while pig iron, scrap and metal supplies had to be diverted when necessary from one destination to another. This compelled foundrymen to practice substitution and conservation in such a way that operations were not always economically sound. Some of the technical features of this practice will be dealt with later. With some government authorities allocating materials via the WPB, and other government authorities fixing prices through the OPA, while taxes, manpower and other management problems rose, the foundrymen had to exercise much versatility to survive. The government organizations did an excellent job, the history of which may remain one of the silent but important contributions to the winning of the war.

Ably assisting foundrymen through the difficult readjustment from civilian production to military production were such organizations as the Gray Iron Founders' Society which worked upon allocations of manpower and materials, cost systematization, safety and wartime security regulations and many other management problems. The American Society for Testing Materials worked up new specifications and necessary wartime adjustments to others. The American Foundrymen's Association acted upon technical matters, many of which are mentioned in this paper. In co-operation with the War Metallurgy Committee of the National Academy of Sciences, an AFA committee succeeded in assembling data that led to an ASTM speci-

Fig. 9—Machine molding for mass production. In shops producing small castings, such as bombs and grenades, limitations in floor space may be overcome by stacking molds one upon the other for pouring. Fig. 10—Showing the stacked and inclined molds ready for pouring gray iron. Fig. 11—Pouring nickel bronze in molds stacked two-high

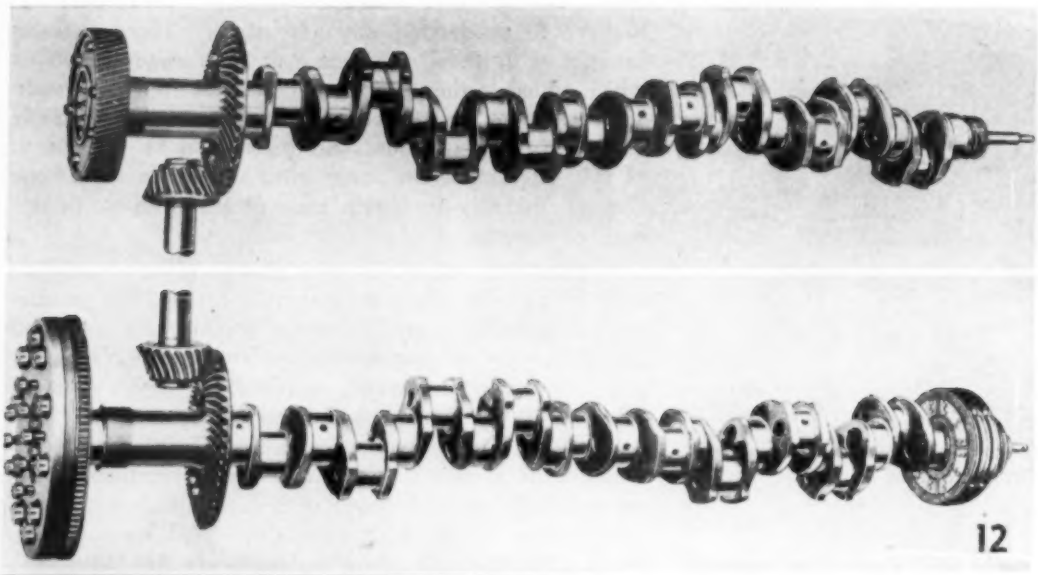


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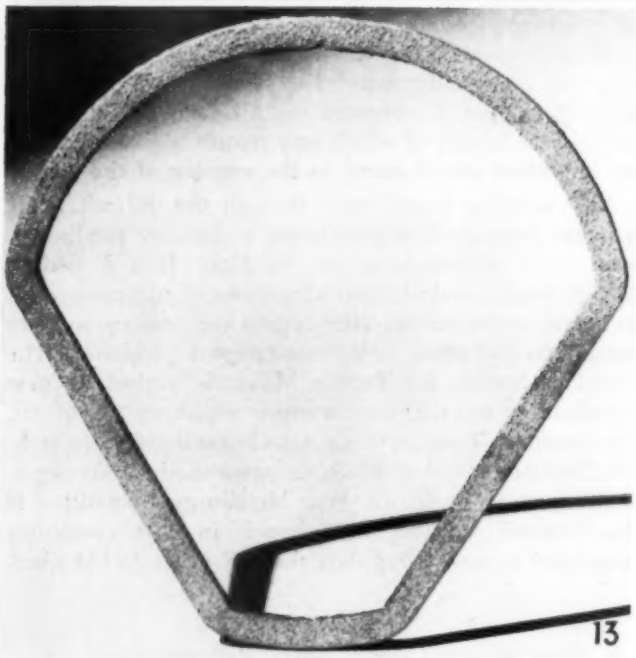
Fig. 12 — High strength alloy twin crankshafts for diesel motor

Fig. 13 — Type of specimen used to test piston ring iron

Fig. 14—Typical mechanical cupola charging. Magnet transfers metal from bins to weigh hopper. Coke and limestone are added to bucket which follows track to cupola charging hoist

Fig. 15 — Method of casting nickel-chromium-molybdenum alloyed and inoculated iron piston rings



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fication for cast iron for use at elevated temperatures. Such co-operation was not unusual. Regional groups, combining practically all of the local units of the different engineering societies, pooled their information and made it available to manufacturers of war material. These groups assembled on short notice for emergency discussions on topics related to war production. In the region of the city of New York, this group was known as the Engineering Societies Committee on War Production.

Among mold materials in the gray iron foundry, some progress seems to have occurred through the increased use of synthetic mixtures made up from a sand of predetermined grain size and shape, with the bond supplied by bentonite or equivalent types of binders. Natural bonded sands continued in favor where supplies and economics and supervisory control were favorable to their use. Cement bonded molding sands continued, at least, to hold their place.

Outstanding developments followed divergent courses.

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Some supervisors attempted to develop specific sand mixtures to fit exacting requirements, especially where large quantities of similar castings were in production. In the jobbing shop, where miscellaneous castings and cores had to be made, the interest was directed toward synthetic mixtures bonded with bentonite and cereal binders to make the sand suitable for all types of molding machines. Cores could be made from the same sand mixture, thus adding to the simplification. This provided the simplicity that was needed to relieve supervision without serious injury to the quality of the resulting castings.

The addition of silica flour to molding sands and cores contributed toward producing strengthened mixtures. In some cases, iron filings offered improvement to core sands.

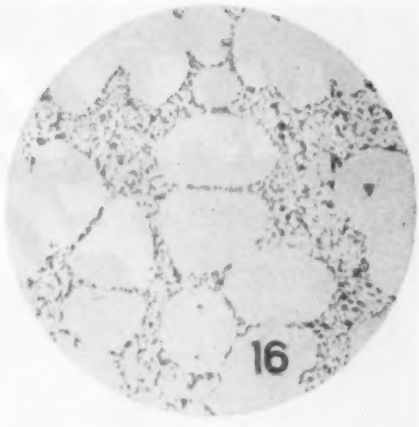
Some improvement in the mechanization of sand conditioning and sand conveying occurred, all designed to bring this material more rapidly to the molding machines wherever large volume production was involved. In some cases new installations were made embodying the general principle of bringing in new sand through overhead hoppers and retrieving waste or used sand through underground channels. A favorite type of mechanized molding might be described as the small and large carousel system. In this construction the small carousel, mounting two or more molding machines, revolved with its crew and equipment and discharged its flasks to the large carousel which conveyed them to the pouring stations and shakeout. Descriptions of this mechanization have appeared in the technical press, and Figs. 1 and 2 illustrate some of them.

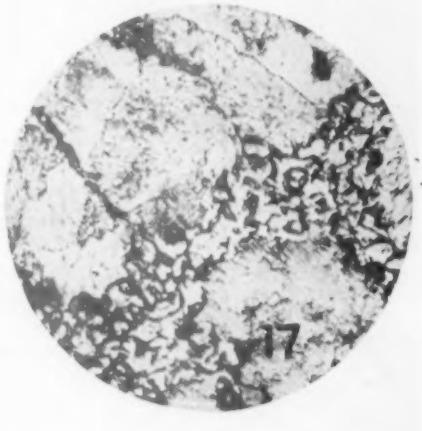
Tendency Toward Push Button Control

Molding machines for molds and cores contributed their specific improvements toward production. There are several varieties, each emphasizing its special merits, but the general trend was toward push-button control of the actuating mechanisms which brought sand (the raw material) to the molds, packed it in place, moved the finished mold along toward the pouring station with a minimum of lifting and handling as in Fig. 3. Only one of the largest and one of the smallest types of machines are mentioned in the following text. Molds for large or irregular shaped castings were made up chiefly with the help of sand slingers as shown in Fig. 4. This type of molding machine varies in detail, but its chief asset is its maneuverability, which enables it quickly to supply large volumes of sand to irregularly shaped molds. At the other end of the scale, small molding machines of the squeezer type were worked to their accustomed capacity of 250 molds per man per 8 hours, while in exceptional cases even larger numbers were delivered. Figs. 5 and 6 illustrate the production of this type in a small foundry engaged in the production of a large number of small castings.

Drying ovens with circulating heat and controlled atmospheres have become typical of everyday foundry equipment. Portable gas or oil fired hoods for drying large molds assisted in expediting production. Infra-red lamps have been used successfully for drying molds as they progressed along conveyors to the pouring station.

The unprecedented demand for castings upon certain industries, such as the machine tool builders, required that their foundries multiply their production ten-fold in some cases. For example, a shop producing 150 tons per month was required to produce 1500 tons per month. Where men, machines and material (*Please turn to page* 226)





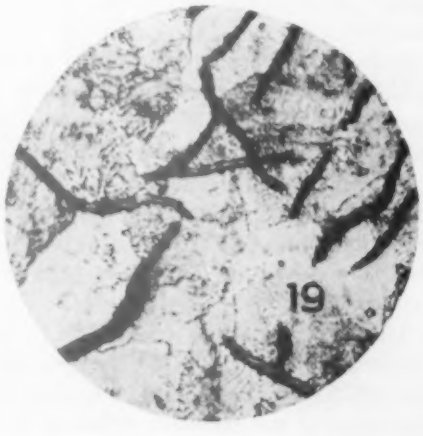


Fig. 16—Untreated machine tool iron from sample near surface. Unetched; 250 diameters

Fig. 17—Same sample as in Fig. 16 but etched and magnified to 500 diameters

Fig. 18—Machine tool iron inoculated with "F" nickel, type B. Sample near surface. Unetched; 250 diameters

Fig 19—Same sample as in Fig. 18 but etched and magnified to 500 diameters

MALLEABLE FOUNDRY DESIGN

Fig. 1—West end of Danville, Ill., plant of Saginaw Malleable Iron Division, General Motors Corp., showing shipping dock. This dock accommodates both freight cars and trucks

ONE OF THE outstanding foundries built during the last few years to furnish castings for the war effort is the malleable iron plant near Danville, Ill., operated by the Saginaw Malleable Iron Division, General Motors Corp. Two articles describing foundry practice at this plant in production of malleable castings for heavy duty military trucks were published in the January and February, 1945, issues of THE FOUNDRY, but because of the interest in modern foundry design this third article is presented to depict some of the architectural and design features of the installation. The accompanying illustrations were furnished through courtesy of Albert Kahn Associated Architects & Engineers Inc., Detroit, architects for the project.

The Danville plant, a Defense Plant Corp. undertaking, was completed in the summer of 1944. Construction is of the permanent type, making the foundry adaptable to post-war production of castings for civilian use. Employment totaled about 1200 on three shifts before war activity ceased.

The project consists of a main foundry building with connected office structure. The foundry is approximately 210 x 570 ft, with a minimum clearance of 22 ft, although clearances of the extensive craneway in the annealing section and in several other areas are higher. Framework is steel with brick walls to the sill height, steel sash and glass windows, and corrugated asbestos siding above the sash lines. The metal roof deck is covered with asbestos roofing finished smooth to facilitate cleaning. The concrete floor is covered with foundry brick paving in the heavy work areas.

Sand, coke and iron are brought in principally by rail, although provision is made also to receive them by truck at the east end of the foundry. The general flow of material in process is from east to west through the full range of normal foundry operations. The west end shipping dock accommodates both rail cars and trucks at depressed levels.

Pattern and maintenance shops and a pattern storage area are included within the foundry, as well as a complete laboratory equipped with fluorescent lighting and tile walls. Incandescent lights are used in the foundry, general lighting being supplemented by extra wattage according to the light requirements of the individual job.

Forced ventilation is employed in the laboratory as well as in the general foundry areas where required, such as in the molding, pouring, shakeout, cleaning and finishing departments. Winter conditioning units are used on the intake vents.

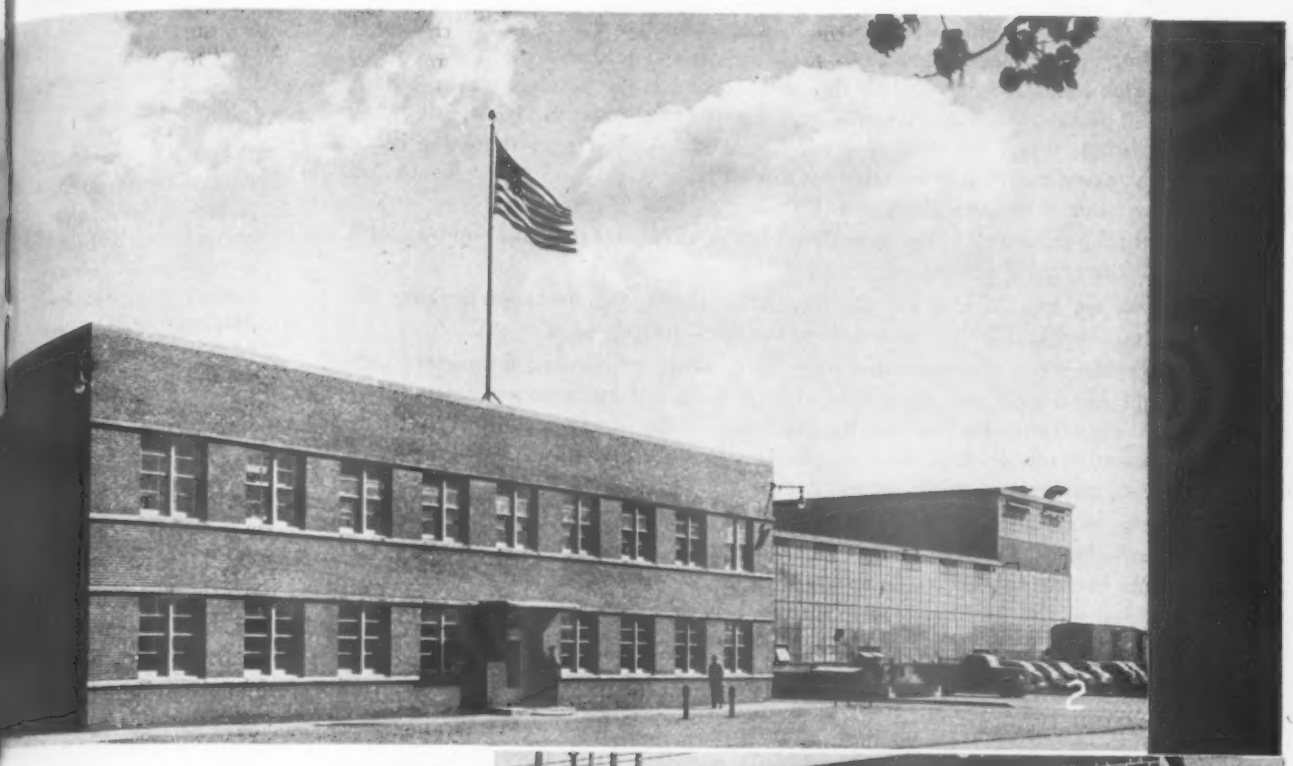


Fig. 2—Office building connects with the foundry. Fig. 3—Propane gas pump house is standby equipment used in event of break in natural gas supply. Fig. 4—Interior view of annealing department. Ovens are lifted by crane and lowered over castings piled on firebrick bases

To move the portable ovens in the annealing department, a craneway with an 80-ft span extends for approximately 360 ft through the area. The crane has a 30-ton lift. Some 24 firebrick bases are installed in this area on which the castings are loaded. A lesser number of portable ovens are required since some of the bases are constantly being loaded or unloaded. When the annealing process is completed on one base the crane picks up the oven and moves it to an adjacent loaded base. A control room is located off the center of one side of the annealing area.

In addition to the craneway in the annealing section, there is a smaller craneway with a 50-ft span in the general work area.

Locker rooms are located beneath the mezzanine in the foundry area flanking the office structure. Complete locker and shower facilities are provided.

The office building is a two-story structure, 50 x 100 ft, of reinforced concrete with brick walls and wood sash and glass. One end of the first floor houses a cafeteria for both office and foundry workers and on the other side of the first floor are first aid, paymaster and personnel offices. Executive, engineering and accounting offices, as well as a conference room, are located on the second floor.

In compliance with former WPB restrictions on building materials, office partitions are of wood and glass. Offices have suspended acoustical ceilings and asphalt tile floors The interior face of outside office walls generally is glazed tile finished. Lights are fluorescent. Summer and winter ventilating units are used, with provision for a future air conditioning installation if desired.

Steam Supplied by Two Coal Fired Boilers

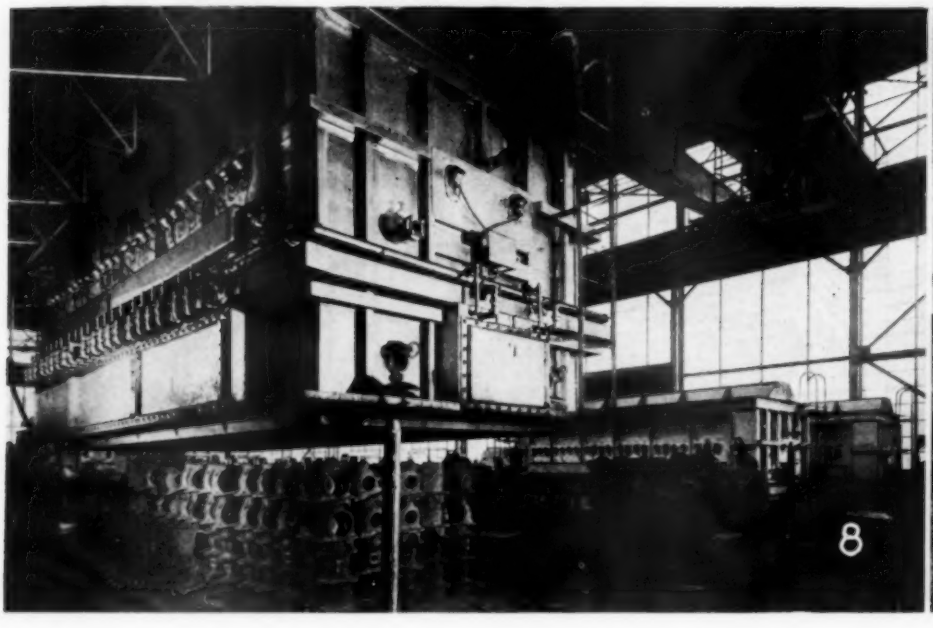
Steam for heating and the small amount required for process work in temperature and humidity control of the cupola air is provided from a boiler house, 40 x 60 ft, housing two coal fired boilers each with a capacity of 10,000 lb of steam per hour. They have the customary combustion controls, forced and induced draft fans, coal handling system, and pneumatic ash handling equipment. The ash silo dumps into either freight cars or trucks, and coal likewise may be received either by highway or rail.

The plant boasts its own sewage disposal system, located adjacent to the boiler house. Sewage is collected at the pump house and put through sedimentation and filter beds. Water comes from the city of Danville.

A natural gas pipeline extending from the Southwest to the Chicago-Cleveland-Detroit area runs within a half-mile of the Saginaw-Danville project. This gas is used in the annealing process at the plant. However, before the War Fuel Adminstration would consent to diversion of gas for this process, government officials insisted that standby equipment be installed in the event of too heavy a drain against the pipeline or an interruption in the natural gas service. To meet this exigency, a system was designed for handling and storage of propane gas on the property.

Propane gas comes in by railway tank car and is pumped to two storage tanks, each with a capacity of 10,000 gal. In the event of a break in the (*Please turn to page* 156)

Fig. 5—East elevation of plant, showing outdoor crane for handling raw materials. Fig. 6—South side of plant includes employees' entrance and door to maintenance and pattern shop. Fig. 7—Shipping docks shown from southwest corner of plant. Fig. 8—Close-up view of one of annealing ovens. Fig. 9—Snag grinders in cleaning and finishing department. Fig. 10—General view of corcmaking department. Large window areas in side walls are common throughout the plant and provide considerable natural lighting



P&H
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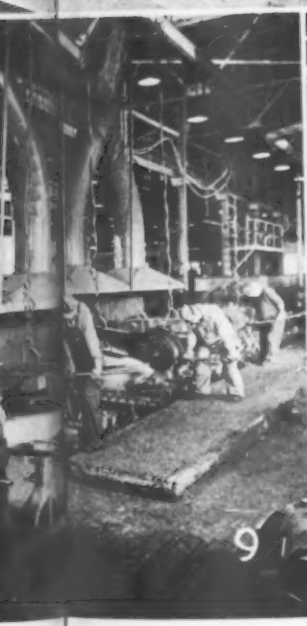
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10

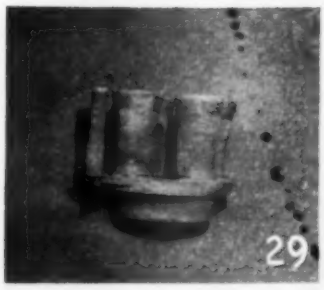
USE OF Insulating Pads FOR PRODUCING SOUND

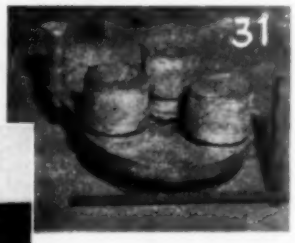
In this second and concluding part of a report describing a technique for production of sound nonferrous castings, the authors discuss additional applications of insulating pads and risers to eliminate shrinkage. The procedure for making these sleeves and pads also is detailed

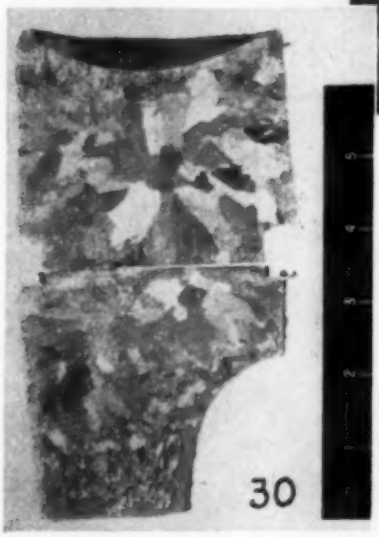
SEVERAL shop castings of a miscellaneous nature made in the foundry during the progress of the experimental work on use of insulating pads and riser sleeves indicated the practical significance of the development. These castings are sufficiently interesting to discuss in considerable detail.

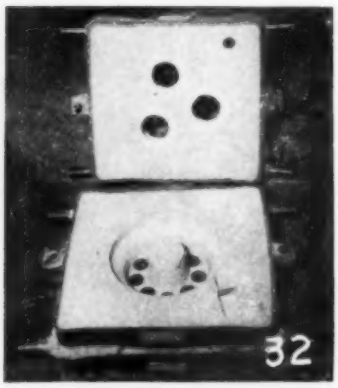
The tin bronze gear blank shown in Fig. 29 is 10 in. in diameter and the finished casting weighed approximately 50½ lb after the risers had been removed. The mold for this casting made with uninsulated risers is shown in Fig. 28. Round chills were placed as shown in the drag. Several attempts to make the casting with fewer and smaller risers failed and even with the arrangement shown a slight amount of shrinkage was found when thin transverse slabs were cut from several positions and radiographed. The macrostructure shown in Fig. 27 is again typical of castings made with uninsulated risers. The fine grained structure immediately above the chills is caused by a different phenomenon than that which causes the apparently fine grain in imperfectly fed sections, and is sound where the latter is not.

The method used for making this casting with insulated risers is shown in Figs.









The opinions expressed are those of the authors and do not necessarily reflect those of the Navy Department.

Fig. 27—Etched section of sand cast gear blank with uninsulated risers. Broken grain pattern in midsection of casting and riser indicates shrinkage. "G" bronze poured at 2100 F.

Fig. 28—Mold for gear blank of Fig. 27 showing chills in drag and risers in cope

Fig. 29—Gear blank casting of Fig. 27. Total weight 122½ lb; weight of casting 50½ lb

Fig. 30—Etched section of gear blank cast with insulated risers. Clearly defined grain pattern indicates proper directional solidification. "G" bronze poured at 2100 F

Fig. 31—Gear blank casting of Fig. 30. Weight of casting 55½ lb; total weight 87 lb

Fig. 32—Mold for casting of Fig. 30 showing location of chills in drag and insulated riser sleeves in cope

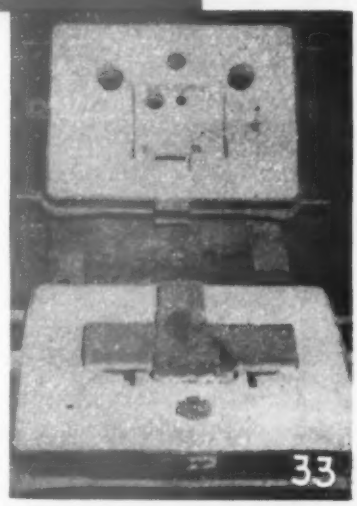
By HOWARD F. TAYLOR and WILLIAM C. WICK
Steel Castings Section
Naval Research Laboratory
Washington

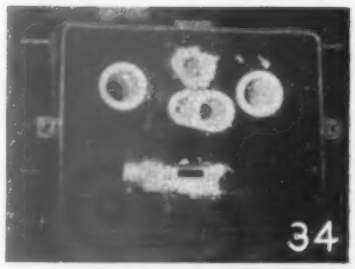
...ds and Riser Sleeves ...BRONZE CASTINGS

28 and 29. Fig. 30 shows the clean, well defined structure with the grains progressively larger toward the riser, indicative of sound tin bronze, and x-ray examination revealed complete soundness in the casting. Both castings, however, appeared to be sound when tested nondestructively by x-ray examination of the whole casting. Fig. 32 shows the insulated riser sleeves in place and Fig. 31 shows the casting. Three risers were used in this case, against four in the former.

A particularly interesting development is shown in Figs. 33 to 36 inclusive. The casting shown in Fig. 35 is a "G" bronze valve which had been extremely troublesome in production at the Norfolk Navy Yard. A co-operative project was arranged to determine if the use of insulated risers would improve the soundness of this critical casting and reduce the number of castings rejected after pressure testing. The casting was approximately 15 in. long, 8 in. in diameter, and the average wall thickness was ⅛ to ⅜-in. in the body and ¾-in. on the flanges.

The experiment consisted of making two castings simultaneously without changing the original gating or risering system. One casting was made with insulation placed around the riser, as shown in Fig. 34, and powdered insulator placed on the metal in the open riser. The other casting was made with uninsulated risers and no insulating compound placed on the metal in the risers. Photographs of typical sections cut from critical parts of the casting are shown in Fig. 36. The sections shown at *A* and *C* represent the casting made with the insulated risers.





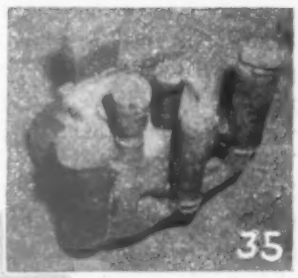
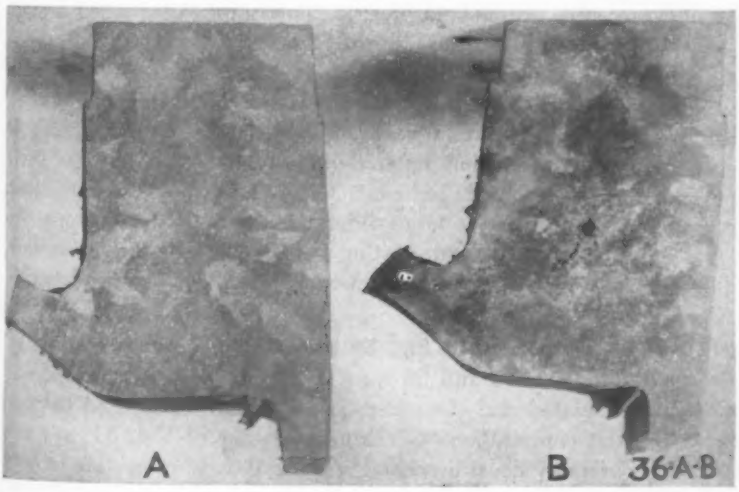
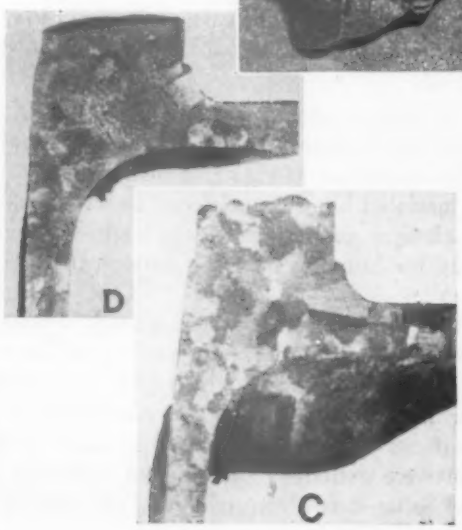
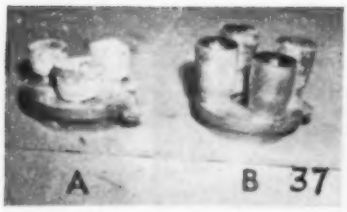


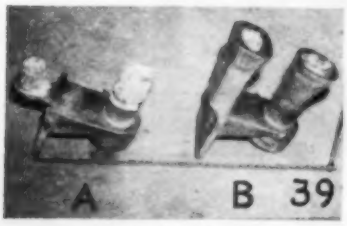
Fig. 33—Mold for valve castings showing core and location of risers. Fig. 34—Cope of mold showing insulated riser sleeves in position. Fig. 35—Valve casting made with insulated risers. "G" bronze poured at 2100 F

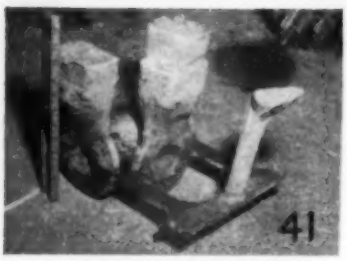
Fig. 36—Sections taken from valve castings. Section (A) and (C) from casting made with insulated risers; sections (B) and (D) from casting made without insulation around risers. Note porosity of (B) and (D) compared with soundness of (A) and (C). "G" bronze poured at 2100 F











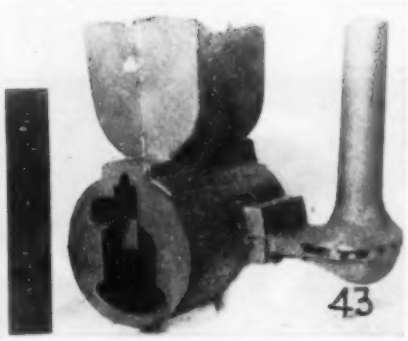


Fig. 37—Manganese bronze gear blanks made with: (A) —insulated risers; (B)—uninsulated risers. Casting weight 55 lb. Total weight of (A) 75 lb; (B) 119 lb

Fig. 38—Manganese bronze gear blanks made with two large uninsulated risers

Fig. 39—Comparison of two similar manganese bronze castings made with: (A)—insulated risers; (B)—uninsulated risers

Fig. 40—Manganese bronze ring casting showing small insulated blind risers

Fig. 41—Globe valve casting made of "G" bronze with uninsulated risers. Total weight 72 lb

Fig. 42—Globe valve casting made of "G" bronze with insulated risers. Total weight 55 lb

Fig. 43—Shop casting of "G" bronze showing molding method

This casting was sound when inspected by x-rays and did not leak under routine pressure tests at the Norfolk Navy Yard. Of interest is the special double riser sleeve made to accommodate the two risers of different size which were placed so close together that two individual riser sleeves could not be inserted.

Several typical castings made to indicate the practical advantages of riser insulation are shown in Figs. 37 to 42 inclusive. Fig. 37 shows again the gear blank discussed previously, for purposes of comparison with the technique used in making the casting shown in Fig. 38. These castings shown in Fig. 37*A* and 37*B* are of manganese bronze. The casting *A* in Fig. 37 was made with three insulated risers 4 in. in diameter and 4 in. high "necked in" to 3 in. diameter at the casting junction. These risers produced a perfectly sound casting. The casting *B* in Fig. 37 was cast in the same manner except that four uninsulated risers were used, each being 4 in. in diameter and 6 in. high. These risers were inadequate and, consequently, at the base of each riser atmospheric pressure caused a "dish" or pocket in the casting. The casting shown in Fig. 38 was of the same order of soundness as the one made as shown at *A* of Fig. 37.

Fig. 39 shows a shaft hanger casting made (*A*) with and (*B*) without insulating risers, and Figs. 41 and 42 show a similar arrangement for a valve casting. Fig. 40 shows the use of insulated blind risers placed above the ring casting. This technique supplies adequate feed metal without the necessity for bringing the riser through to the top of the mold.

Another interesting tin bronze casting is shown in Fig. 43. It was necessary to make the surfaces of the cored parts of the casting smooth enough to provide a sliding fit for another part without benefit of machining or grinding. The surfaces of nonferrous castings made previously in gypsum were extremely smooth and indicated the possibility of using it as a core material. The casting shown in section as Fig. 45 was made with gypsum cores. The riser and outside of the castings were molded in ordinary sand. The unetched section of Fig. 45 is particularly interesting as it shows how the riser froze over at the top due to radiation and how atmospheric pressure broke through the skin of the casting beneath the riser to relieve the partial vacuum developed due to shrinkage inside the riser. The gypsum cores conducted heat less readily than the sand, and all surfaces next to the sand froze first. The hot spot was located beneath the riser instead of at the top of the riser, where it should have been. Fig. 44 shows the casting made with gypsum cores and insulated riser, the outside of the casting proper being in sand. The riser in this case is excessive. In spite of the difference in grain structure between the castings of Figs. 44 and 45 the composition and pouring temperature of the metal are the same for each.

Figs. 46 and 48 present photographs of flanged fittings made of manganese bronze and composition "G" and physical properties obtained from specimens cut from the castings in the locations shown in the sketch of Figs. 47 and 49. The results are self-explanatory and no attempt is made to expand upon their significance as too few such tests were made to be conclusive. However, it is interesting to note that the large difference in the physical properties of the "G" bronze casting between the light pipe section and the heavy flange section is reduced when insulation is used on the risers.

The sketch of Fig. 50 shows how the step castings of Figs. 51, 52 and 53 were made. As shown, one side was insulated and the other was not. The metal used to pour the composition "G" bronze casting of Fig. 51 was not properly deoxidized and was gassy. It is interesting to note

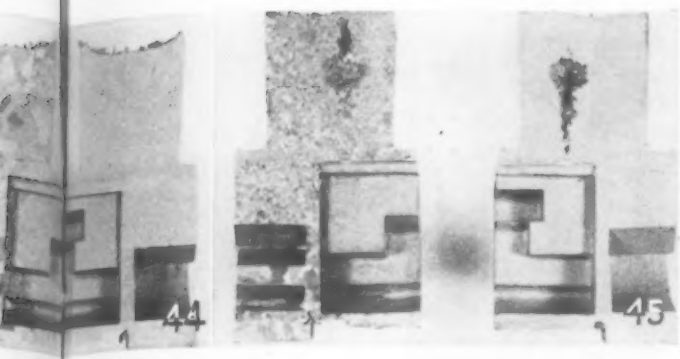


Fig. 44—Sectioned shop casting made with plaster cores and insulated riser in sand mold. Shows complete soundness. "G" bronze poured at 2100 F

Fig. 45—Sectioned shop casting made with plaster cores and uninsulated riser in sand mold. Shows effect of atmospheric pressure. Note shrinkage cavity and broken grain pattern. "G" bronze poured at 2100 F

Fig. 46—Flanged pipe casting with uninsulated riser on left flange, insulated riser on right flange. Manganese bronze poured at 1830 F

Fig. 47—Sketch of flanged pipe casting of Fig. 46 showing location of test specimens. Table 3 uninsulated riser; Table 4 insulated riser

Fig. 48—Flanged pipe casting made with insulated riser on left flange, uninsulated riser on right flange. "G" bronze poured at 2100 F

Fig. 49—Sketch of flanged pipe casting of Fig. 48 showing location of test specimens. Table 5 uninsulated riser; Table 6 insulated riser

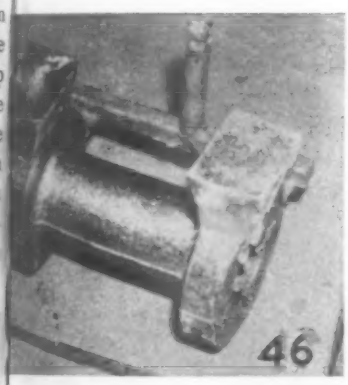
that in spite of this the section of casting adjacent to the insulation was sound. Evidently solidification was retarded enough to allow the gas to escape. The unsoundness of the casting next to the sand is often found in "G" bronze castings not properly degassified. The "G" and manganese bronze castings of Figs. 52 and 53, respectively, were sectioned, etched, and tested for hardness as indicated. The hardness was very uniform throughout, even though one side solidified against a sand surface and the other was insulated. Large risers were used above the largest section in each case and feeding was adequate. The hardnesses are approximately the same as for sand castings.

Conclusions—The information presented in this report permit the following conclusions to be drawn:

a. Controlled directional solidification is essential to the manufacture of sound nonferrous castings. This can best be obtained by careful attention to gating and risering practices.

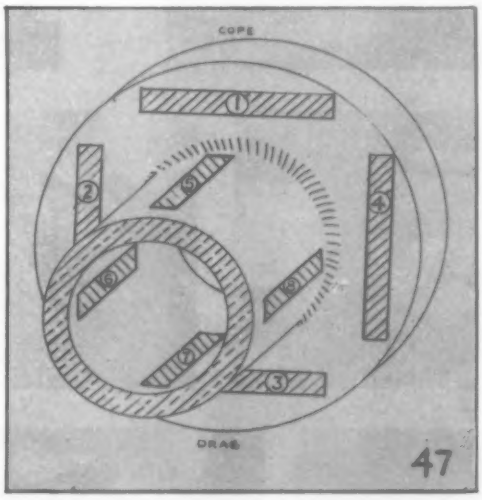
b. The interdendritic shrinkage of "G" Bronze and the gross shrinkage of manganese bronze have a similar origin —lack of sufficient feeding which can be corrected by proper control over the temperature gradients within the solidifying casting.

c. Atmospheric pressure operates to the advantage or disadvantage of casting soundness in nonferrous metals to fully as great an extent as it does in steel, and the principles of operation are identical. Whether good or bad castings result depends upon how well this important foundry tool is understood and applied. Theories and techniques have



SAND		
SPECIMEN NO	TENSILE STRENGTH PSI	PERCENT ELONG IN 2"
1	73,250	32.8
2	72,750	26.8
3	74,150	35.9
4	71,750	24.2
5	67,250	15.7
6	65,500	14.8
7	66,000	14.8
8	73,250	28.1

TABLE 3



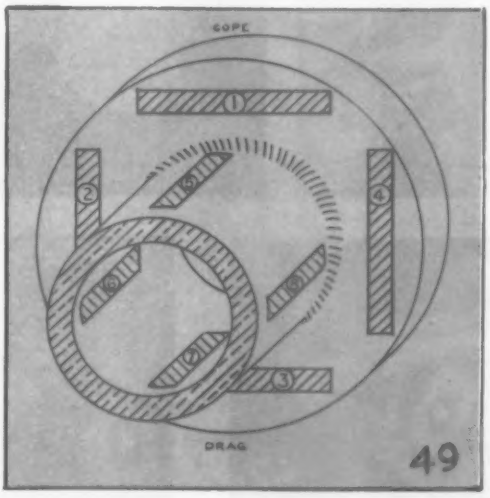
PLASTER		
SPECIMEN NO	TENSILE STRENGTH PSI	PERCENT ELONG IN 2"
1	72,250	27.4
2	74,000	32.8
3	74,200	35.2
4	73,750	34.4
5	63,750	12.5
6	72,200	21.1
7	70,250	20.3
8	74,200	28.1

TABLE 4

SAND		
SPECIMEN NO	TENSILE STRENGTH PSI	PERCENT ELONG IN 2"
1	*	—
2	26,800	15.7
3	18,300	7.8
4	23,100	9.4
5	42,500	40.6
6	41,950	42.2
7	41,200	35.2
8	39,550	31.2

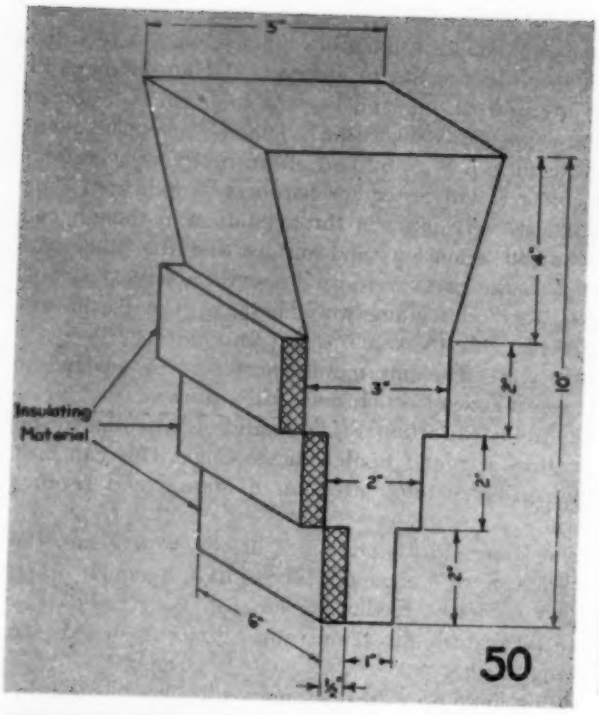
* Broken during machining

TABLE 5



PLASTER		
SPECIMEN NO	TENSILE STRENGTH PSI	PERCENT ELONG IN 2"
1	37,700	53.1
2	33,800	23.4
3	36,600	25.8
4	33,100	23.4
5	43,000	48.5
6	42,600	44.5
7	46,100	49.1
8	44,600	52.3

TABLE 6


5"
3"
2"
6"
Insulating Material
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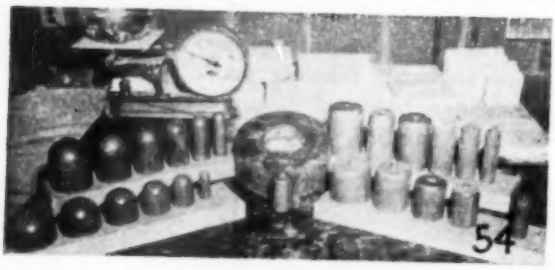
51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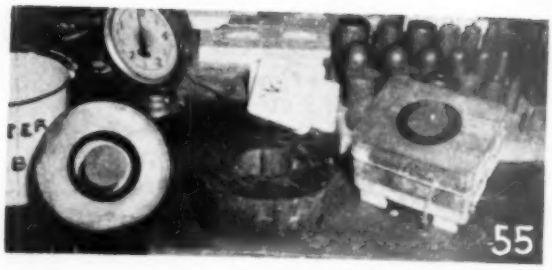
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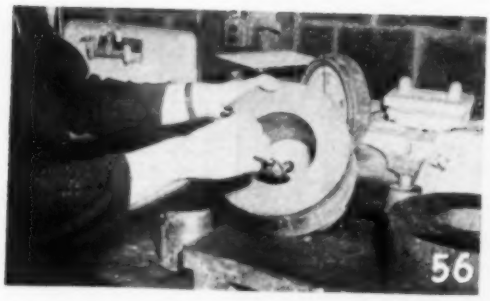
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63

Fig. 50—Sketch of step casting showing dimensions and method of making tests of Figs. 51, 52, 53

Fig. 51—Section of step casting, showing gas porosity inside casting skin on uninsulated side. Slower skin formation rate on insulated side allowed gas to escape. "G" bronze poured at 2100 F

Fig. 52—Section of step casting; right side uninsulated, left side insulated. Test indicated very slight difference in brinell hardness from right to left. "G" bronze poured at 2100 F, etched to show grain pattern

Fig. 53—Section of step casting made and tested identical to Fig. 52. Shows same relative properties. Manganese bronze poured at 1830 F

Fig. 54—Assortment of mold forms used to make insulated riser sleeves

Fig. 55—Assembled mold forms for making insulated riser sleeves

Fig. 56—Brushing separating agent on mold form. Fig. 57—Weighing water used in making plaster slurry. Fig. 58—Weighing gypsum used in making plaster slurry. Fig. 59—Sprinkling weighed gypsum onto weighed water surface

Fig. 60—Hand mixing gypsum and water to form smooth, lump-free slurry.

Fig. 61—Pouring slurry into mold forms. Fig. 62—Striking off excess plaster before riser sleeve is removed from form. Fig. 63—Removing "set" riser sleeve from form. Fig. 64—Assortment of insulating riser sleeves. Fig. 65—Placing green plaster sleeves in oven to be dried before using

already been worked out by steel foundrymen and should be carefully studied by nonferrous foundrymen interested in improving their practices. Although fundamental principles apply similarly to all metals, techniques vary somewhat.

d. The x-ray is a powerful tool in revealing unsoundness in nonferrous castings which is not readily apparent by other testing methods. X-ray studies of thin, transverse sections cut from pilot or test castings will do much more to improve gating and risering practices if careful attention is paid to the radiographs.

e. Low density areas in nonferrous castings are revealed on polished and etched cross sections by a broken, poorly defined grain pattern, usually surrounded by an area of larger clear-cut grains. The shrinkage can then be verified by x-rays of thin, transverse sections cut from the area.

f. A study of transverse x-rays can be used to indicate the reason for leakage in nonferrous pressure castings. Improperly fed castings, particularly in "G" bronze, will usually show an extensive low density area surrounded by a relatively small amount of sound metal. The outside, sound portions are often removed by machining and leakage takes place through the filamentary shrinkage voids.

g. It is possible that the major portion of rejects of nonferrous castings are a direct result of inadequate feeding rather than the many other variables often blamed.

h. The feeding range and efficiency of risers, when designed and used according to usual foundry practices, are limited and considerably less effective than might be expected. These limitations exist because the molding sand around the risers is a relatively good conductor of heat and because of loss of heat by radiation to the air if open risers are not covered with some form of insulation.

i. It has been found possible to very greatly increase the overall efficiency of risers by insulating them and by using insulating pads on thin sections when it is necessary to feed through thin sections to reach heavier sections beyond. Gypsum, when used in the manner described in the Appendix, has been found to be an efficient insulator, economical and easy to fabricate into any desired shape. Gypsum powder is also used as an insulator by sprinkling it over the top of open risers.

Advantages of importance to foundrymen which result from the use of insulating pads and riser sleeves are as follows:

a. *Sounder Castings*
   1. This is the result of the metal in the riser remaining molten until long after the casting has solidified.
   2. By use of the pads on thin sections the feeding range of risers is increased.

b. *Increased Yield*
   1. The riser volume can be reduced by as much as 75 per cent in certain cases. The contact between riser and casting can be materially reduced.
   2. This results in a markedly greater number of castings per ladle of metal.

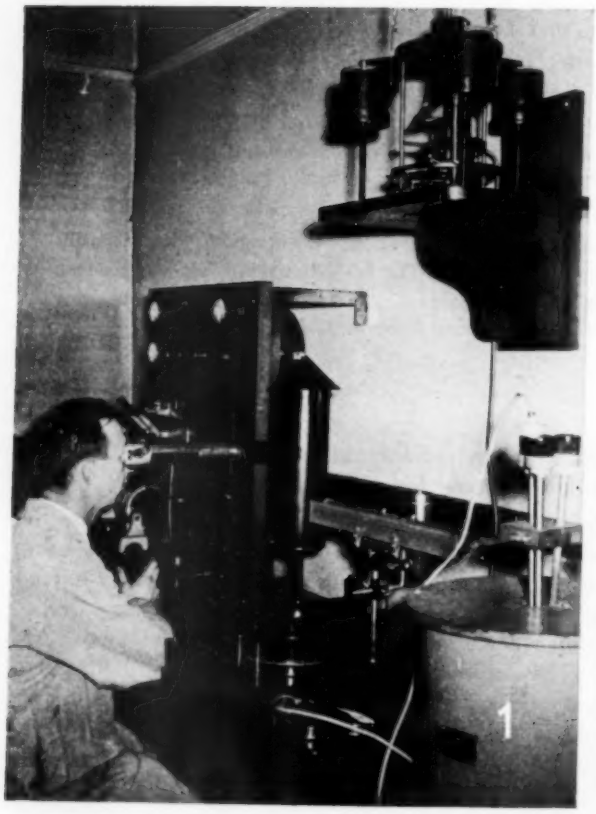
c. *Reduced Cleaning Cost*
   1. Removal of risers and materials handling are simplified because smaller and often fewer risers are required. Also the contact between riser and casting can be materially reduced to the point where the risers may be removed with a hammer blow.

Disadvantages are:

a. *Cost of preparing and using insulators.*
   1. This is not great as the materials are cheap and easy to handle.
   2. Nothing is more expensive than an unsound casting. (*Please turn to Page* 260)

FOUNDRY RESEARCH —
In the Chilled Car Wheel

Influence of research in improving the quality of cast iron chilled car wheels is discussed in this fifth of a series of articles describing the experimental work being carried on by various members of the foundry industry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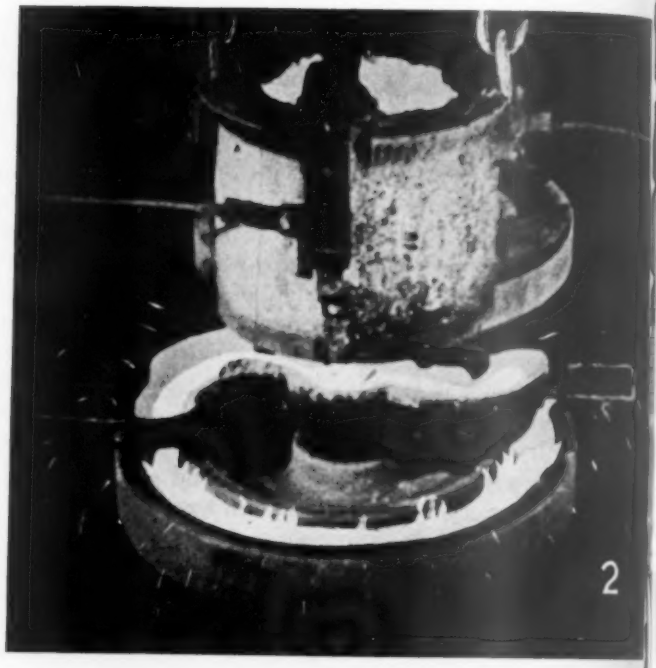
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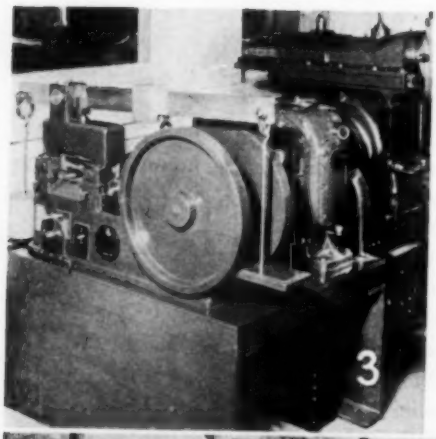
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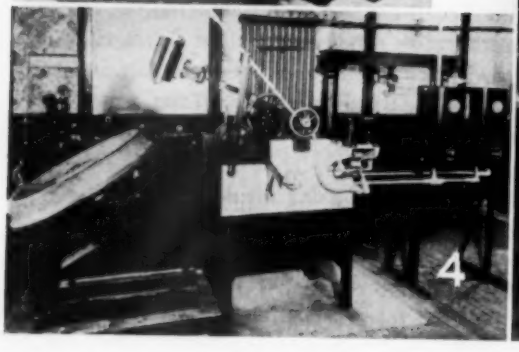
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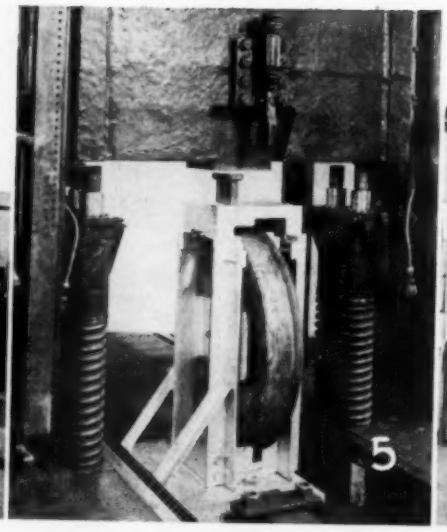
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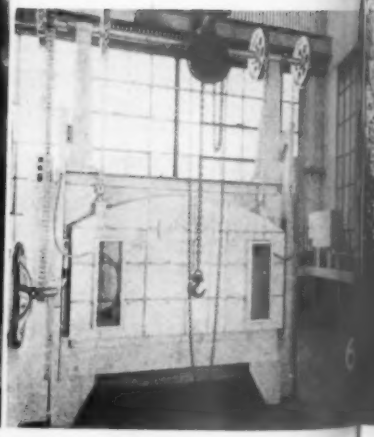


By EDWIN BREMER
Metallurgical Editor
THE FOUNDRY

Industry

THE REMARKABLE feat of American railroads in carrying 748 billion ton-miles of freight during 1944, or double that handled in 1918, with one-fourth fewer cars than were available a quarter century ago, can be attributed to a large extent to the ability of the modern cast iron chilled car wheel to resist wear and withstand the grueling pounding of rail joints under heavy load.

Chilled car wheels first were used over 125 years ago. Through the years there have been many changes in design and metallurgy, with the end not yet in sight, for the cast iron chilled car wheel producers, individually and through the Association of Manufacturers of Chilled Car Wheels, constantly are carrying on research to better their product.

Available information indicates that the first chilled car wheels were made in England in 1818. They were 34 in. in diameter, slightly larger than the present-day 33-in. diameter wheel. The wheels weighed about 250 lb, compared with weights of 650 to 850 lb today. Likewise the treads were 3 in. wide and 1 in. thick, against the present 4 11/32-in. tread from 2 to 2⅛-in. thick. The British wheels contained six straight spokes, compared with the present solid web with brackets under the flange. Chilled car wheels probably were made in the eastern seaboard of this country about 1833, but the first car wheel foundry was established by Jonathan Bonney in 1836 at Wilmington, Del., a predecessor of the Lobdell Car Wheel Co. That foundry had a capacity of ten wheels a day ranging from 32 to 43 in. diameter. Wheels had straight spokes and the hubs were split in three sections to counteract shrinkage. Chill in the tread varied from nothing up to the full thickness of the tread.

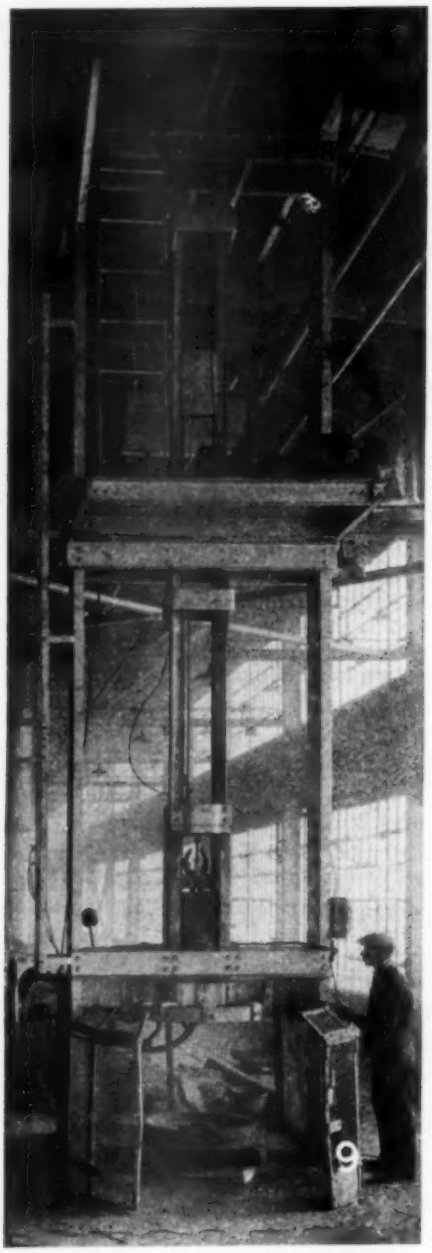
In 1886 the Pennsylvania Railroad developed the drop test to determine the strength of chilled wheels, and in 1889 the Master Car Builders issued the first specifications for inspection and testing of wheels. Those included a drop test of five blows with a 140-lb ball falling 12 ft, and a minimum chill of ⅞-in. at the throat or junction of flange and tread. In 1896 the thermal test was developed to ascertain the ability of a wheel to withstand sudden application of brakeshoes, and consisted of pouring a 1½-in. ring of molten metal around the tread for two minutes. Appearance of cracks caused rejection. In 1904 the Master Car Builders brought out the first standard designs for wheels weighing 600, 650 and 700 lb for 30, 40 and 50-ton capacity cars, respectively.

In 1908 the Association of Manufacturers of Chilled Car Wheels was formed, and over the years it has been engaged in improving the quality of the cast iron chilled car wheel through research conducted in its own laboratory and in those of member companies. This research is concerned not only with metallurgy but also with design, foundry procedures and methods, cupola control, chill control, annealing procedure, etc. All of these factors are interrelated, and developments in the various fields have resulted in the modern chilled wheel.

Design of the chilled car wheel is related closely to metallurgical features and quality as well as to the mechanical properties which permit the wheels to withstand thrusts, impact and wear. Hence, it is not surprising that considerable study and research have been, and still are being, devoted to design. The original spoked wheel, with

Fig. 1—Pyrometers used by association members are calibrated regularly in this department. Fig. 2—In the thermal test a ring of molten iron is poured around the tread of the wheel. Freedom from cracks in tread and plate is necessary for passage of the test. Fig. 3—One of the wear testing machines used to determine abrasion resistance. Fig. 4—A special machine designed to ascertain impact resistance of the wheel flange

Fig. 5—This machine is employed to study the ability of the wheel rim to withstand constant pounding against rail joints in service. Fig. 6—Electrically heated furnace in laboratory has a capacity of two full-size wheels, and is used for investigation of heat treatment and annealing procedures. Fig. 7—Fracture structure of older style, single-plate wheel. Fig. 8—Appearance of fracture of newer type, single-plate, bracketed wheel



its unequal sections, engendered casting stresses difficult to alleviate. Present-day wheels have a solid web or plate which, with the hub and tread, is dish-shape to withstand thrust and impact. Gradual change of section and brackets, with generous fillets between hub, plate and tread, leads to uniform distribution of metal and cooling to provide proper metal structures and hardness in the gray section of the wheel; it also eliminates casting stresses or places them where they will be relieved during the annealing process.

Control of chill in the tread has received considerable attention over the years, since the life of the wheel depends largely on that factor. To the uninitiated it might seem that with the proper composition of iron and thickness of chill ring, no difficulty should be encountered. However, in addition to those factors, control of chill involves the temperature at which metal is melted and poured, shakeout time, annealing procedure, molding, etc. Control of composition is concomitant with control of chill, and to that end developments were made in cupola control involving mechanical charging procedure, hot-blast cupola, use of soda ash for desulphurization, and, more recently, the application of carbon dioxide recording apparatus to ascertain combustion conditions.

Pouring Temperature Is Important

Careful study and investigation of melting and pouring temperatures have indicated that the least variations in depth of chill and overall shrinkage are encountered when the iron is melted at about 2650 F and poured at 2425 F. Iron melted at extremely high temperature and poured at the normal temperature produces a high strength product, but causes irregular shrinkage and a chill with a distorted mottle. Iron melted or poured cold is out of the question in making chilled wheels, since results are so erratic that they are difficult to enumerate.

One of the recent developments in chill control of wheels is the use of tellurium in combination with graphite, which usage is the culmination of a long study and investigation. Tellurium is from 100 to 150 times more powerful than chromium in ability to produce a given chill depth. However, while it causes a deep chill, it does not retard the formation of ferrite, and it also results in a sharp demarcation between the chilled portion and gray iron. The question naturally arises as to why use tellurium when satisfactory chill depth can be secured through the regular procedure of employing a ring chiller. This is answered by pointing out that while the depth of chill secured by regular methods was satisfactory, there was a tendency toward formation of a coarse or open mottle portion between chill portion and the gray iron structure, unless all conditions mentioned previously were right. (*Please turn to page 264*)

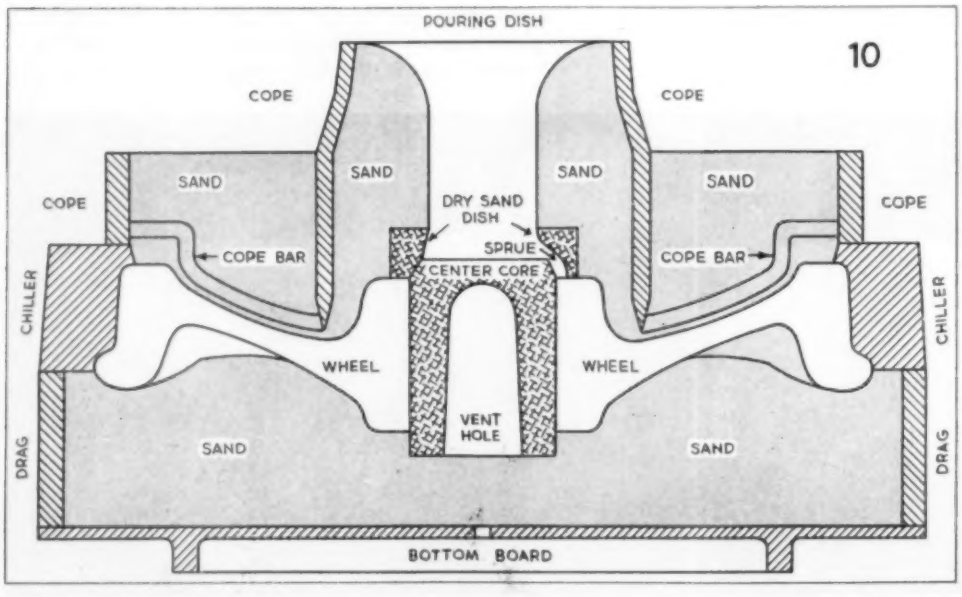


Fig. 9—Routine drop test is performed on a certain number of wheels selected from each day's heat. In this test a 250-lb weight is dropped on the hub of the flange-supported wheel from a predetermined height. Wheel must withstand 12 blows without cracking

Fig. 10 — Diagrammatic sketch of mold for the single-plate, bracketed wheel showing the various components and their arrangement

Glamour IN A FOUNDRY? Sure!

By MAURICE BEAM
Editorial Correspondent
THE FOUNDRY

"Casting directors" are an old story to Bing Crosby, so it's not surprising to find him in the casting business as part owner, with his brother, Larry (left), of the Major Aircraft Foundry Corp., Puente, Calif.

LARRY CROSBY and his brother, the famous Bing, are foundrymen; Larry through an accident before the fact, and Bing through what may be termed investment after the fact.

The fact was and is an aluminum foundry, the Major Aircraft Foundry Corp., of 740 W. Valley Blvd., Puente, Calif. Puente is a village not far from Hollywood where the Crosby brothers also have some major investments.

Before the war, Puente was noted chiefly for the quality products of its truck farmers. Now it is beginning to bristle with smokestacks—exclamation points amid pastoral orange groves to mark the end of Southern California's rustic era as its new industrial growth sets in.

The Puente foundry has long since ceased to be just another casual item in the Crosbys' copious investment portfolio. They have discovered in it and in the techniques it uses a high degree of interest quite aside from the fiscal sort. In a word, these two dealers in and masters of glamour have discovered that their (*Please turn to page* 188)

Want Uniform Color on Bronze

Q.—We are interested in methods for cleaning and securing a uniform copper-like finish on small bronze castings. Our interest is twofold, and might be divided as follows: First, a tumbling or similar method of giving some degree of smoothness and uniformity to rough or finished castings. Second, in producing a uniform color by dipping.

A.—Use of the tumbling process for cleaning and burnishing nonferrous castings to obtain a smooth surface has been practiced for years where it is not essential that

the castings retain sharp edges. A newer development is the tumbling barrel using a stream of water and sand under high pressure. Combination of sand and water effectively cleans the castings. In the regular tumbling barrel method, the barrel is partly immersed in water, and filled almost to capacity with castings and cleaning stars or balls. In some foundries the scouring or burnishing agent is spills, skimmings, floor sweepings, screenings from the sand piles, etc. which also results in recovery of metallic content of those materials. The barrel is rotated for several hours until the desired cleaning and smoothness of surface are attained.

In many cases the color developed in tumbling is satisfactory to the purchaser, but if not a further operation of dipping may be employed. A wide variety of dipping baths are used and generally are composed of various proportions of sulphuric, nitric and hydrochloric (muriatic) acids and water. One commonly used is composed of 1 gal H_2SO_4, 1 gal HNO_3 and 2 oz NaCl or HCl. A dip said to be fumeless contains 1 gal H_2SO_4, 3 lb $NaNO_3$ (saltpeter), and 1 gal water. A fumeless bath used in Great Britain is composed of 1 gal water, 21 oz HNO_3, 64 oz H_2SO_4, 1 oz HCl, and 13 oz CrO_3. In making up those solutions the acid always should be added slowly to the water, and not vice versa as sulphuric acid creates heat and will spatter badly if water is added to it.

Since the baths operate rapidly in removing discolorations resulting from oxidation and other causes, the castings need be dipped only for a few seconds. The castings then are rinsed in running cold water, followed by immersion in hot water which aids in drying. Drying is finished by rolling in sawdust. To prevent later tarnishing on exposure to the atmosphere you may find it advisable to add a small amount of oil soap to the final hot water rinse—about 1 oz to the gallon. That leaves a thin, invisible soap film on the casting surface.

Aluminum Castings Are Pitted

Q.—Our small aluminum vacuum cleaner nozzles, apparently perfect in the as-cast condition, develop pin holes and one or more larger cavities when the surface is buffed and polished. Is there any paste or other material with which these pits can be filled satisfactorily?

A.—We do not know of any commercial material designed to repair surface defects on aluminum castings. In some instances solder may be rubbed over a hot casting and then wiped off. In other instances the defective areas are repaired by welding. However, from an examination of the sample castings submitted for inspection, the solution of your problem is not a material to fill the cavities in the castings, but a change in your melting and pouring practice that will prevent the formation of the defective areas.

The pin holes and the occasional larger cavities are formed by gas inclusion in the metal. This gas, in small or large amount, is absorbed by the metal if it is held too long or at too high a temperature in the furnace. Pin holes also result from the use of damp sand, sand that is rammed too hard, or sand with low permeability. In some instances the method of manipulating and pouring the metal is responsible. All turbulence should be avoided. The lip of the ladle or crucible should be held as close as possible to the top of the sprue, and the sprue should be kept full with a steady unbroken stream during the pouring period.

Defect Caused by Damp Lining

Q.—We are forwarding several small gray iron castings showing a form of defect that leaves us puzzled as to the cause. The molds are made on the bench in the ordinary routine manner. For no apparent reason some of the castings present small or large areas of small cavities after the first cut is taken in the machine shop.

A.—From an examination of the castings and from former experience we are inclined to the opinion that the holes are caused by steam trapped in the metal. You may have noted a small ball or pellet in many of the holes. That feature always is present in metal agitated by steam. The most probable cause of the trouble is a wet ladle lining. In some instances the steam impregnated metal comes from a wet, cold or hard cupola bottom and ap-

pears only in the first tap. When the sand bottom in the cupola becomes heated and dry, the boiling action ceases. However, in the majority of instances the metal leaves the cupola in a perfectly satisfactory condition. The boiling action commences when the metal comes into contact with a damp ladle lining. Most of the steam escapes, but a certain amount is trapped in the metal stream and carried into the mold. Metal in a state of agitation should not be poured into a mold.

Pours Copper in Metal Mold

Q.—We would like to know whether copper can be cast successfully in metal molds. The copper is No. 1 electrolytic copper.

A.—Pouring of pure copper is difficult at best, and we know of no one who is casting the pure metal successfully except those in the copper business, making billets and other shapes for later processing into rods, tubes, sheets, etc. So-called pure casting copper which is cast for the chemical trade is, in reality, an alloy of copper with zinc or tin or both. Alloying percentages are kept low so that the color is almost that of pure copper. However, the electrical conductivity is impaired, and if the castings are to be used for electrical purposes, the reduction in conductivity must be taken into account by the designer.

Casting of so-called pure copper into metal molds is being done but each producer has developed a special procedure for gating the casting, and consequently has the molds made to his own design. Molds preferably are made from gray iron high in graphite to withstand repeated heating and cooling. Possibly you might be able to use molds made of graphite or carbon machined from electrodes of those materials. While somewhat fragile, with a little care in handling, they will serve satisfactorily. Manufacturers of permanent mold castings are rather reticent on methods.

If you wish to attempt to make copper castings in permanent molds, you will find that there are a number of details which must be considered carefully. Those include mold wall thickness which regulates the rapidity at which heat is absorbed from the casting, the coating used on the mold face, and as previously mentioned, the gating and risering system. Some of the coatings used to retard heat transference from the metal poured into the mold are chalk or refractory clay suspended in water, graphite suspended in water, oil or gasoline.

Those coatings can only be applied thinly since if they become thick there is a tendency toward flaking or cracking off, and it is rather difficult to patch the coatings at such points. Consequently the whole coating must be removed and a new one put on. Hence, if considerable retardation of heat extraction is desired at some point the insulating material which may be an asbestos or asbestos-clay mixture, is applied to the outside of the mold or the section is heated by application of a gas flame. Conversely, if more rapid chilling is desired, the radiating surface of the mold may be increased by use of thin ribs or stubs or pins, and by blowing a stream of cold air over the surface.

Molds must be operated at a temperature sufficient to prevent cold shuts, but not so high that solidification of the casting is retarded to any degree. Preliminary heating usually is accomplished by gas flames, and regulation of the mold temperature is controlled by the adjustment of the cycle of pouring and cooling.

Color Aluminum Oxide Coating

Q.—Could you tell us if there is a method of coloring aluminum? If there is please give us any information relative to procedure, whether it is patented, etc.

A.—Aluminum and its alloys may be colored, and the method of accomplishing involves a number of operations. First the object is polished, buffed or sandblasted, depending upon the final appearance desired. The piece then is cleaned to remove any grease, and subjected to an electrolytic anodizing process which develops a heavy oxide coating. The coated object is removed from the anodizing bath and colored by any three methods. One is the immersion in a dilute dye bath of the desired color. The second involves treating the anodized object by pickling in an organic acid or salt, sodium borate, ammonium phosphate, sodium borate, etc., and then immersing in a basic dye. Third method employs inorganic pigment materials, and usually involves double coating. For example, the object dipped in lead acetate followed by potassium chromate or dichromate will give yellow; orange is developed with potassium antimonyl tartrate followed by hydrogen sulphide, etc.

It is said that use of organic dyes as the coloring medium follows the same pattern as for fabrics in that fading occurs after a period, and that for more permanent results mineral pigmenting is preferable, although the color range and appearance are not quite as brilliant. We believe that coloring processes relating to aluminum coloring are covered by patents, and suggest that you look into that phase before proceeding.

GANGWAY!

By J. A. Patterson

"You wouldn't dare!"

Castings Centrifugally Poured Are Porous

Q.—We have been pouring centrifugal castings in silver, gold and metals included in the copper field, and we find that we have developed porosity in our finished product. Do you have available any information on the problem of spruing or gating these objects? Has there been published or is there available any data with reference to the speed and kick-off power necessary for successful centrifugal casting? Also has any description been published on commercial centrifugal practices employed?

A.—Your question relative to difficulties encountered in centrifugal casting is not clear as to whether you are doing the work experimentally, or you have been engaged in it for some time. However, from other information requested it appears that you are just beginning. While you do not mention what mold material you are using, it probably is a plaster of paris or gypsum-base, since that is satisfactory for most nonferrous metals and alloys. Without a specimen to examine, we can only hazard some guesses as to what is causing the porosity you mention. One of the first which comes to mind is whether or not the mold is absolutely dry when the metal is poured. Air drying is not sufficient, since considerable water still is contained in the plaster even though it looks and feels dry. Mold must be heated at a temperature high enough and long enough to drive off all moisture. Temperatures may range from 600 to 1300° F, and the time from 8 or 10 to 2½ hr; the least time is used with the highest temperature.

Another consideration is whether or not the mold has sufficient venting or porosity to carry off any gases which might be generated by molten metal in contact with the mold material. If you are using straight plaster it should be opened up through use of fibrous talc in the ratio of about 4 lb plaster to 1 lb talc. Another possibility for porosity might be melting conditions which result in gas absorption by the metal or alloy being melted. Absorbed gases are held in solution until just before solidification, when they are released. Generally gassed metal is indicated by the appearance of pinholes on the surface or just under the skin.

So far as we know there are no hard and fast rules pertaining to gating of centrifugal castings other than to get the metal into the cavity rapidly without turbulence. Like any other method of casting, gating will have to be predicated on experience and by experiment. Gates should be large enough but not too large, since that is a waste of metal. In some cases, it may be advisable to extend the gate beyond the casting into a small pocket or blind riser. First metal goes through the cavity carrying any dross or dirt into the pocket, where it is retained. Clean metal then enters the cavity.

Speed of rotation of the mold may vary over wide limits, according to available information as discussed by Dr. J. E. Hurst in "Centrifugal Casting Speeds" which appeared in the April and June, 1945, issues of THE FOUNDRY. Range may be from 1000 to 3600 surface feet per minute. The latter speed is used in small dental-type casting machines calculated on the maximum diameter of the mold cavities about the axis of rotation. A number of articles have been published in THE FOUNDRY on production of castings by the centrifugal method and include:

"Producing Nonferous Castings Centrifugally", by Zeuhlke, October, 1942; "Casts Steel Centrifugally", by Donoho, April, 1943; "Centrifuging After The Mold Is Filled", by Wright and Caine, May, 1943; "Steel Sheaves Are Cast Centrifugally", Johnson, June, 1943;

"Pours Steel in Cores Spun Vertically", by Baumer, July, 1943; "Ford Casts Cylinder Barrels Centrifugally", August, 1943; "Hydraulic Drive Spins Steel Casting Machines," by Bremer, November, 1943, and "It Can Be Cast Centrifugally", by Putchinski, August, 1944.

Iron Composition Is Not Suitable for Disks

Q.—Gray iron disks, ¾-in. thick and 12 inches diameter, machined on the rim and on both faces, have been rejected on account of minute holes on the surface. The disks are used for polishing diamonds. Small imperfections may cause the diamonds to crack or work loose in the holders. We are forwarding a piece of a casting for your inspection and for an opinion on the probable cause of the trouble.

A.—In contrast to many inquiries and to many forms of defects that bring up more questions than a guessing contest, one look at the machined face and the fractured section is sufficient to show that the composition of the metal is at fault. Instead of being close and fine grained, it is coarse and open grained. It is nice machinable iron, quite suitable for a variety of uses, but entirely unsuitable for polishing disks. It is too high in carbon and silicon. These elements can be reduced and adjusted by addition of steel to the cupola charge. By reducing the analysis to almost the chilling stage, the face of the casting will polish like silver. In fact it is an open question if an improved type of casting could not be produced, by casting the face against a chill and finishing the surface by grinding.

Wants To Color Bronze For Final Finish

Q.—We would like to color or tint bronze to obtain a lasting finish, and will appreciate some information on how it is done. Also is there any book which goes thoroughly into art bronze work?

A.—Coloring of metals and alloys to obtain the desired effect requires some skill and practice since the variation in copper content has considerable influence on the results. In some cases it may be necessary to give the object a thin plating of copper to obtain a uniform color. For best results it is absolutely necessary that the object be clean, and preliminary to coloring it should be cleaned in an alkali, vapor degreasing or other bath to remove oils, etc., and rinsed carefully. Then it should be given a pickle or acid dip in a dilute solution of sulphuric and nitric acids, and again rinsed carefully to remove all traces of acid.

The piece is ready for coloring, and the solution to be used will depend on the desired color. For obtaining what is termed a patina or somewhat greenish color try a solution composed of 3 oz copper nitrate, 6 oz ammonium chloride, 5 oz calcium chloride, and water to make 1 gal. Use at room temperature. Immerse object and allow to dry after removal from solution. Several dippings may be required to develop desired depth of color. A brown color that often is employed with brasses and bronzes can be produced by immersing the object in a sulphide bath containing 1½ to 2 oz of sodium or potassium sulphide or ammonium polysulphide to the gallon of water. Solution is used at about 175 F. After removing object from bath it should be rinsed and dried. In most cases it is advisable to lacquer the coating to preserve it. The only book we can recall on coloring procedure is "Metal Coloring and Finishing" by Hugo Krause.

Considers Production of Experimental Melts

Q.—We are considering the installation of a small melting furnace for experimental purposes. If the project is completed our idea is to make small melts of various types of iron alloys, cast them into test specimens and put them through various types of destructive and non-destructive tests to prove their worth. Do you think it advisable to use an electric furnace or crucible type unit for the work?

A.—An easy reply to your question relative to small melting units would be to

(*Concluded on page* 120)

HOW TO MAKE IMPLEMENT AND TRACTOR PARTS Last Longer...Work Better

TYPICAL ANALYSES OF ALLOY CAST IRON IMPLEMENT AND TRACTOR PARTS

Applications	Total Carbon	Silicon	Nickel	Chromium	Molybdenum	Brinell Hardness	Tensile Strength (lbs./sq. in.)	Desirable Characteristics
Pulleys and Frames	3.40-3.60	2.00-2.50	.25- .50 .50- .80	.....	.....	160-180 160-180	35,000 min.	Improved Machinability Resistance to Impact
Clutch Plunger Rods	3.20-3.40	1.80-2.10	.50-1.00 .60-1.00	.25- .40	.....	160-200)	35,000 min.	Resistance to Wear Improved Machinability
Clutch Plates	3.00-3.25	1.60-2.00	.50- .80 .60- .90	.20- .35 .40- .60	.25- .45	175-225)	35 to 50,000 min.	Resistance to Wear Improved Machinability
Brake Drums	3.00-3.25	1.60-2.00	1.00-1.50 1.25-1.75	.35- .60 .15- .30	.....	175-275)	35 to 60,000 min.	Resistance to Wear Heat Treat Hardenability Improved Machinability
Gears and Sprockets	2.75-3.20	1.40-1.80	.40- .65 .75-1.25 1.00-1.50 1.50-2.00 2.00-2.50	.30- .60 .50- .80	.30- .60			Improved Machinability Resistance to Growth
Cylinder Heads	3.00-3.25	1.40-1.80	.30- .60 .50- .80 .60-1.10	.15- .30 .25- .50 .15- .30	.....	170-200) 170-200)	35 to 40,000 min. 35 to 40,000 min.	Improved Machinability Resistance to Growth Resistance to Growth
Motor Blocks	3.00-3.25	1.40-1.80	.30- .60 .45- .80	.15- .30 .25- .40	.....	160-190)	35 to 40,000 min.	Resistance to Wear Heat Treat Hardenability
Exhaust Manifolds	3.00-3.25	1.40-1.80	.30- .60 .75-1.25	.15- .30	.....	190-260	40 to As Cast 60,000 min.	Improved Machinability Resistance to Growth
Cylinder Sleeves and Liners	2.90-3.25	1.30-1.70	.50-1.00 1.25-1.75 1.50-2.00	.30- .60 .50- .80	.30- .60	350-500 As Cast) 190-300)	As Heat Treated 75,000 min. 40 to 50,000 min.	Resistance to Wear Heat Treat Hardenability Improved Machinability Resistance to Growth Resistance to Impact
Valve Inserts	2.90-3.25	1.40-1.80	.50- .80 .50- .80	.40- .60 .30- .50	.30- .50			Resistance to Wear Heat Treat Hardenability Improved Machinability Resistance to Impact
Crankshafts	2.60-2.90	1.70-2.00	1.00-1.50 1.50-2.00 1.75-2.25	.....	.70-1.00 .30- .60 .40- .80	230-290 As Cast 300-420 As Heat Treated	65,000 min. 80,000 min.	Resistance to Wear Resistance to Impact
Seed Grinding Burrs	3.50-3.75	.50- .75	3.25-3.75	1.90-2.20	.....	*600-750		Resistance to Wear Resistance to Impact
Plow Points	3.25-3.50	.80-1.10	4.25-4.75	1.50-2.00	.....	*550-750		

*Chill cast or sand cast white.

LET THIS TABLE BE YOUR GUIDE TO 5 IMPORTANT BENEFITS OF Nickel Alloy CAST IRON

Use this handy table.

It's a useful guide to help you pick the right alloy cast iron for each point of stress or wear in your equipment.

It's surprising how much improvement can be made with the right metal in the right place.

Especially suited to agricultural uses, Nickel cast irons afford resistance to wear, to impact, and to growth at elevated temperatures.

In addition, these cast irons possess heat treat hardenability, grain refinement and improved machinability.

Nickel imparts strength, hardness, toughness and resistance to wear and to corrosion.

Consultation on the use of alloys containing Nickel in your product or equipment is invited.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET NEW YORK 5, N. Y.

(*Concluded from page* 118)

ask how much money you are willing to spend. If the idea is to keep the cost at the minimum, the oil-fired crucible furnace probably would be the logical choice. However, if cost is secondary then you might purchase a small electric arc furnace, or a small high frequency induction furnace. Your attention is directed to what you expect to accomplish by the proposed testing. Presumably you desire to develop better iron alloys which can be made into castings superior to those now available, and in that case it seems to us that it would be wise to use the same type of melting unit for the pilot work that you will in commercial production.

The reason for this suggestion is that you will find it much easier to obtain reproducible results. In other words, with an electric or crucible furnace you will be able to exert much closer control of composition, temperature and atmospheric conditions during melting than you can in a cupola, and the results obtained from metal melted in each will not necessarily be comparable.

Small Castings Not Made From All Steel Mix

Q.—Under normal conditions a great deal of steel scrap, but very little gray iron scrap comes out of the railroad yards. Is it practical to melt this steel scrap in the cupola and pour it into small castings 2 to 5 pounds in weight and ⅜ to ½ in. in thickness? How would the strength of these castings compare with the strength of plain gray iron castings?

A.—Synthetic cast iron is made from 94 per cent steel, 4.5 per cent ferro silicon and 1.5 per cent ferromanganese. However briefly, the answer is no. It is neither commercial nor practical to melt an all steel charge in the cupola and pour the resulting metal into *small* castings. The metal could be melted and poured, but the castings would be so hard and brittle they would be of no practical use. Steel in varying amounts added to the usual cupola charge of pig iron and gray iron scrap, increases the strength of the resulting metal, provided the analysis of the metal conforms to definite specifications. Thickness of section is one of the principal factors affecting the analysis. Metal from the same cupola mixture will be white and hard in a thin casting, and gray and machinable in a thick casting.

The second main factor that affects the result is the relative proportion of combined and free or graphitic carbon. In the molten state the carbon is all in the combined form. When this metal is poured into a thin mold or a chill mold where it is cooled quickly, the carbon remains in the combined form and the metal has a dense white fracture and is exceedingly hard. This property is taken advantage of in the manufacture of car wheels, rolling mill rolls, and other castings subjected to severe wear or abrasion in service. Where a certain amount of the combined carbon is converted to free or graphitic carbon by the action of silicon in the mixture, the character of the iron is changed.

Carbon content of miscellaneous steel scrap varies from 0.10 per cent in horseshoes and plate clippings, to 0.70 per cent in rails. In the cupola this metal absorbs carbon from the coke up to about 2.50 per cent. Assuming that the steel forms 25 per cent of the charge, the remaining 75 per cent has to be adjusted to bring the total charge to the correct analysis for the desired castings. For the castings you have in mind the approximate analysis would be: TC 2.90 per cent, Si 2.50 per cent, Mn 1.00 per cent, S 0.10, P 0.10 per cent.

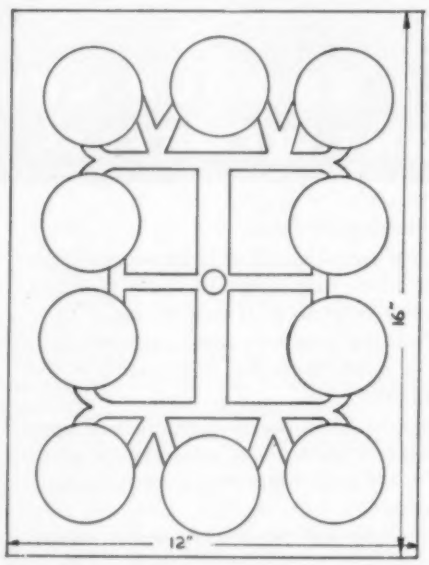
Core Cuts Through One Surface of Casting

Q.—We are forwarding a small bell-shaped brass casting 3 in. diameter and 2 in. high on which our loss is high. The molds are made on a machine with ten patterns on a plate in a 12 x 16-in. flask, 3 in. cope and 3 in. drag.

A.—The cause of the defect is quite plain; the core has cut through on one side, but a checkup on the equipment, method of making the mold and pouring the metal will be necessary to decide which factor in the sequence of production is responsible. If all the castings show the same defect, it is reasonable to assume that patterns are at fault. If some of the castings are good and some are bad, we may dismiss the pattern theory and look elsewhere.

The first and most probable cause of the trouble is loosely fitting flask pins. A ⅛-in. play in the flask guides would shut off most of the mold cavity on one side. If the mold is made in a snap flask, there is a possibility of a slight shift between cope and drag while the molder is carrying the completed mold from the machine to the floor.

A somewhat remote, but still possible cause of the trouble, is the practice of placing all molds on tilted racks before they are filled with metal. This represents excellent practice in many instances, but with this particular casting it is dangerous. The metal fills the low side of the molds first and exerts enough pressure to push or tip the green sand cores slightly out of place, thus shutting off the normal space on the opposite side.



Metal is introduced to each bell mold through two gates to prevent side pressure against the core

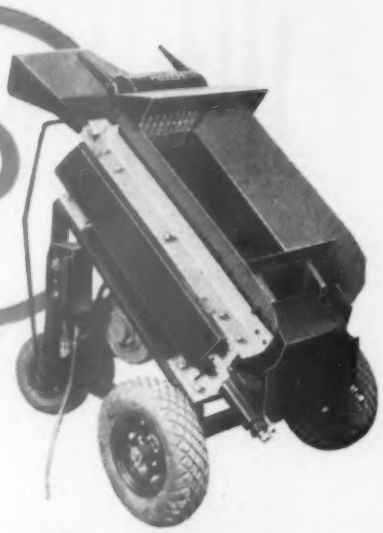
If the mold is made flange up and the core is suspended from the cope, it will be necessary to use two, three or four nails to support the sand. These nails stiffen the core and prevent a pushover. Nails also should be used for reinforcement in the core where the mold is made flange down, that is with the entire outside part of the mold in the cope and with the green sand core standing on the drag. Where the individual mold cavities are filled through a single gate, the metal rises higher on one side than on the other and has a tendency to push the core to one side. The metal should enter the mold through opposite gates as shown in the accompanying sketch in an adjoining column.

Information Desired on Making Plow Points

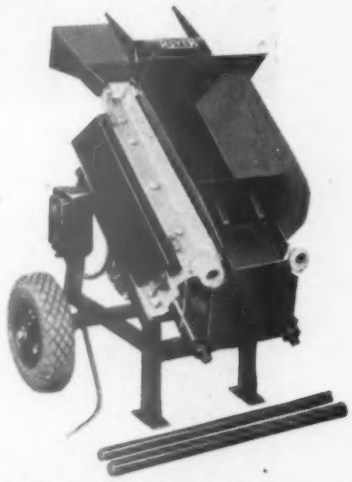
Q.—We shall appreciate information on the following points in relation to the manufacture of plows: 1—Are the majority of plows in the United States, that is the point and the remainder below the beam, made of cast iron or steel? 2—What is the best cupola mixture for the points and for frame between the beam and the point? 3—How are the points sharpened after they are worn? 4—How are the castings molded? Are the points chilled? 5—What kind of paint or varnish is applied to impart the shiny blue color to the points? 6—Do you know of any book devoted to the subject of plow manufacture?

A.—Generally speaking, the point of most plows is cast iron. Landsides, mold boards and standards vary with different plows. In most walking plows the standard is malleable. Landside and mold board are cast iron. 2 and 4—These two features are too extensive to be covered in the space at our disposal. We are enclosing tear sheets from the May, 1942, issue of THE FOUNDRY, detailing methods and materials employed in a prominent plow manufacturing plant in this country. Chills are incorporated in the drag of the plow point molds. 3—Concave plow points are self sharpening. When the other types become blunt or worn, they are discarded. 5—Practically any of the prominent paint companies are in position to supply a special lacquer for imparting the blue finish color to plow points. 6—We do not know of any book dealing with the subject of plow manufacture. Descriptions of plant layouts, and the methods and materials employed in plow manufacturing plants, have been presented in THE FOUNDRY on many occasions.

.....and now 700 ROYERS in Service



Model "NC-4" for average to large jobbing shops, 12 to 16-tons per hour.



Model "NB-2" for average jobbing shops, 7½ to 10-tons per hour; Model "NB-4" (4 wheels), 7½ to 10-tons per hour.

The Royer, Jr. for small grey iron and nonferrous foundries — 2 to 5-tons per hour.

Again we must pause to express our appreciation to the many foundries which are using Royer Sand Separators and Blenders.

The list not only contains the names of America's outstanding foundries, but also includes a host of medium-sized and smaller ones. Hundreds of foundries have installed their first Royers during the past year. Others have used the same machines for many years, and we hear from them only at rare intervals when they need new parts.

Repeat orders are quite common in the list. Some foundries have re-ordered Royers as many as five times. There are companies with twenty or more.

Royers last so long because they were designed by practical foundrymen, and built for many years of service under severe conditions.

An imposing number of foundries are including the Royer in their re-conversion plans, availing themselves of the "Six Point" Sand Conditioning which the Royer alone provides. Too, the Royer will be an important factor in postwar profits because it reduces costs. One man with this inexpensive machine can prepare more sand than a gang using other methods. And the Royer provides better sand; the kind that reduces discount losses and greatly improves casting surface quality, with a resultant reduction in cleaning room costs.

There's a Royer model and size for every foundry requirement. Ask for Catalog 744 showing typical foundry installations.

ROYER

FOREMOST IN SAND CONDITIONING EQUIPMENT

ROYER FOUNDRY & MACHINE CO.

KINGSTON, PENNSYLVANIA

MEN of Industry

HARRY G. McMURRY

HARRY G. McMURRY, since February on special assignment foundry work for the Buick Motor Division, Flint, Mich., has been appointed foundry manager for General Motors Holdens Ltd., Melbourne, Australia, and will leave for Melbourne shortly after the first of the year to supervise layout and construction of a new automotive gray iron and malleable foundry there. Born in Jackson, Tenn., he studied mechanical engineering at Lambuth College in Jackson and in 1927 joined Buick, serving there continuously with the exception of two years at the foundry of Dodge Division, Chrysler Corp., Detroit. At Buick he was associated successively with the time department, laboratory and foundry, holding various positions in the latter division including shakeout foreman and assistant metallurgist. Mr. McMurry was instrumental in organizing the Saginaw Valley Chapter of the AFA and was secretary in its first year, currently being chairman. Until leaving for Australia he has headquarters at General Motors Overseas Division, Detroit.

G. A. ENGLAND

♦ ♦ ♦

G. A. England, New York sales agent, American Car & Foundry Co., has been appointed manager of foundry sales. Mr. England attended the University of Missouri, and joined American Car & Foundry Co., in 1923, as assistant chemist in the St. Louis foundry, subsequently becoming chief chemist, assistant to manager of foundries, and in November, 1944, he was transferred to New York as sales agent.

Roger W. Griswold Jr., the first president of the newly-formed Northwestern Pennsylvania Chapter of the AFA, is foundry superintendent of the Griswold Mfg. Co., Erie, Pa. Born in Erie, Mr. Griswold was graduated from the Babson Institute of Business Administration, Boston, in 1939, and shortly thereafter started work in the shop and foundry of the Griswold company. He was appointed foundry superintendent in 1943. Mr. Griswold was prominent in the organization of the Northwestern Pennsylvania Chapter last spring.

♦ ♦ ♦

B. A. Dollens, who recently was appointed general manager of the Saginaw Malleable Iron Division, Saginaw, Mich., has been associated with General Motors Corp. divisions since 1925, when he was graduated from Purdue University. Joining the Delco Remy Division, Anderson, Ind, as a layout man, he became a foreman in 1927 and assistant superintendent of Plant Six a year later. Subsequent positions were plant engineer, assistant chief inspector for the division, and in 1931 he was made superintendent of the Delco Remy gray iron foundry. Advanced to the superintendency of Plant Six in 1939, Mr. Dollens became superintendent of the company's new aluminum foundry in 1941, and with the opening of the Bedford, Ind., aluminum foundry in 1943 he was named general superintendent of nonferrous foundries. A year ago he was made a member of the staff of O. V. Badgley, Delco Remy general manager and appointed manager of Delco Remy battery operations. In his new position Mr. Dollens succeeds James H. Smith, who has been transferred to the staff of W. C. Williams in Detroit.

♦ ♦ ♦

W. D. Bailey Jr., recently sales manager of Westlectric Castings Inc., Los Angeles, has been appointed vice president and general manager of the com-

(*Continued on page* 124)

ROGER W. GRISWOLD JR.

B. A. DOLLENS

W. D. BAILEY JR.

A Message to *Our Foundry Friends*

WITH today's peak demand for Woodward pig iron, it is impossible to maintain any stock of merchant iron.

Making pig iron is not like pouring coffee from an urn. Production schedules must be planned carefully ahead.

We earnestly request our good friends in the foundry trade to notify us of their needs and particular specifications as far in advance as possible—not less than two weeks ahead and as much more as can be given.

During this abnormal period it is only by this close co-operation that we can give the service to which you are entitled on—

Uniform WOODWARD IRON

WOODWARD IRON COMPANY

WOODWARD, ALABAMA

Independent Since 1883

GENERAL SALES OFFICES: 1515 First National Building • Birmingham, Alabama • Phone 4-6786

(*Continued from page* 122)

pany. He has been associated with the company since 1941, and for the preceding six years was with the Pacific Metals Co., Los Angeles. Mr. Bailey served as president of the Southern California Chapter, AFA, last year. He has been succeeded as sales manager of Westlectric by **Edmund V. Linsenbard.**

• • •

Roy W. Bennett, until recently foundry engineer, E. F. Houghton & Co., Philadelphia, has been appointed director of sales and research, Foundry Division, the Metro-Nite Co., Milwaukee. Mr. Bennett's previous connections include Harry W. Dietert Co., Detroit, and American Steel Foundries, Indiana Harbor, Ind.

• • •

Lt. Col. Leroy E. Everett, after more than three years with the Army Air Forces, has been relieved from active duty and has joined Lester B. Knight & Associates, Chicago, foundry engineers and consultants. Colonel Everett entered the foundry industry in 1921 with American Steel Foundries at Indiana Harbor, Ind. In 1925 he joined the Nugent Steel Castings Co., Chicago, as research engineer, and two years later went with Illinois Clay Products Co. as foundry engineer. In 1931 he was made superintendent of the steel foundry of the Stockham Pipe Fittings Co., Birmingham. Two years later he went to Los Angeles as superintendent of the Warman Steel Casting Co., and in 1934 returned to the Stockham company in the same capacity. In 1937 Colonel Everett joined the Key Co., East St. Louis, Ill., to build, install and manage its new steel foundry. Four years later he redesigned, re-equipped and then operated the gray iron foundry of the Kaukauna Machine Corp., Kaukauna, Wis., until called to active duty with the army. His military duties the first two years consisted of designing and building repair facilities in England for the 8th Air Force, while more recently he was commanding officer of the 479th supply depot, later enlarged to form the 579th air service group. Colonel Everett was active in forming the Birmingham Chapter of the AFA, and is a past chairman of the St. Louis District Chapter.

• • •

Arthur H. Suckow, elected chairman of the Western New York Chapter, AFA, for 1945-46, is metallurgist for the Symington-Gould Corp., Depew, N. Y. Mr. Suckow first entered the inspection department of the Gould Coupler Co., then was placed in the physical testing department and subsequently was transferred to the chemical laboratory, where he became chief chemist. During this time he also studied metallurgy at night school. The Gould organization later was merged with the T. H. Symington Co., and since 1926 Mr. Suckow has been metallurgist for Symington-Gould. He has been active in the Western New York Chapter, serving last year as vice chairman. He is also a past director of the Buffalo Chapter, ASM. During the late war he was a member of the Cast Armor Development Group.

• • •

W. H. Wezel has been appointed chief metallurgist, Production Foundries Division, Jackson Industries Inc., Birmingham. A graduate of Wabash College, Mr. Wezel joined Caterpillar Tractor Co., Peoria, Ill., in 1935, and subsequently worked as foreman in charge of cupola operation, assistant metallurgist and foundry research engineer. In 1943 he joined American Brake Shoe Co., New York, as metallurgist, remaining there until his recent appointment at Jackson Industries.

• • •

Howard L. Creps, assistant sales manager, Frank Foundries Corp., Moline, Ill., since 1937, has been transferred to the Muncie, Ind., plant, as resident sales manager. Mr. Creps spent ten years in the gray iron foundry of Gale Mfg. Co., Albion, Mich., before joining Frank Foundries. **William C. Bell,** formerly design engineer, John Deere Harvester Works, East Moline, Ill., succeeds Mr. Creps as assistant sales manager.

• • •

J. L. Lessman has been appointed general molding foreman in the high alloy heat and corrosion-resistant steel department, American Steel Castings Co., Newark, N. J. Mr. Lessman was formerly associated with the Fort Pitt Steel Casting Co., McKeesport, Pa., where he was successively engaged as general molding foreman, metallurgist, foundry engineer and electric furnace melter.

• • •

Frank E. Walling, acting manager of the Lewis Foundry & Machine Division, of Blaw-Knox Co., Groveton, Pa., has been made president and general manager of the division. Mr. Walling, a graduate of Lehigh University, was associated with Lukens Steel Co., Coatesville, Pa., and the Carnegie-Illinois Steel Corp., Duquesne, Pa., before joining Lewis Foundry & Machine Division in 1941. He has held the positions of assistant to the manager, vice president in charge of operations and acting manager of the division, since that time.

• • •

James W. Jackson, recently superintendent in charge of the chilled car wheel and brass foundries of Griffin Wheel Co.'s Tacoma, Wash., plant has been made sales agent for the company in the Northwest. He has been succeeded by **James F. Dolansky,** formerly molding room foreman at Griffin's Salt Lake City plant. Mr. Jackson has been with the company more than 30 years, starting in the cupola room at Chicago. After serving as foreman there until 1918, he was transferred to Denver as assistant superintendent, and in 1924 went to Kansas City in the same capacity. He was made superintendent at Tacoma in 1925, placed in charge of Cleveland Production Co., Cleveland, in 1930, and returned to Tacoma in 1939. Mr. Dolansky also started

(*Continued on page* 128)

ROY W. BENNETT

LT. COL. L. E. EVERETT

ARTHUR H. SUCKOW

THE LAST DROP IS AS GOOD AS THE FIRST

Ask the Men Who Use It!

Noah Webster... HAD A WORD FOR IT!

Some forms, eh? Noah Webster says UNIFORM means "having the same form." We make no claims for the beauty of DAYTON OILS, but we do claim that the UNIFORM quality and unvarying perFORMance will help you produce flawless castings. Try DAYTON OILS and form your own opinion. We'll rest our case on results.

The DAYTON OIL COMPANY

DAYTON 1, OHIO

STEEL CORE AND MOLD WASHES - BINDER AND CORE PASTE - CORE WASHES - CHILL COATINGS

You NAME it . . . and

WHEELABRATOR

CLEANS it

SMALL, fragile castings . . . huge, bulky castings . . . complicated, cored castings . . . none of these is an obstacle to cleaning by the airless Wheelabrator. In fact, the list of work now being Wheelabrated covers almost the entire field of metal products.

This universal application of the Wheelabrator springs from its fast, cost-reducing performance and the perfection of its cleaning. The Wheelabrator throws a storm of more than 280,000 shot or grit per second that no scale or surface dirt can withstand. The result is a clean, bright finish right down to virgin metal. This speeds up machining and grinding . . . lengthens tool life . . . simplifies inspection . . . improves appearance . . . provides a perfect bond for final finishing.

Wheelabrating also eliminates the costly expense of generating compressed air and the need for pressure tanks, piping, compressors, nozzles, mixing chambers, air receivers, etc. In doing this it affects tremendous savings in horsepower, often as much as 80%.

These are only a few of the many ways in which Wheelabrating improves cleaning operations and efficiency. A survey of your problem, plus cleaning tests in our factory laboratory, will enable us to give you a complete report on how Wheelabrating can be of specific help to you. Why not write us today?

Wheelabrator Tumblasts

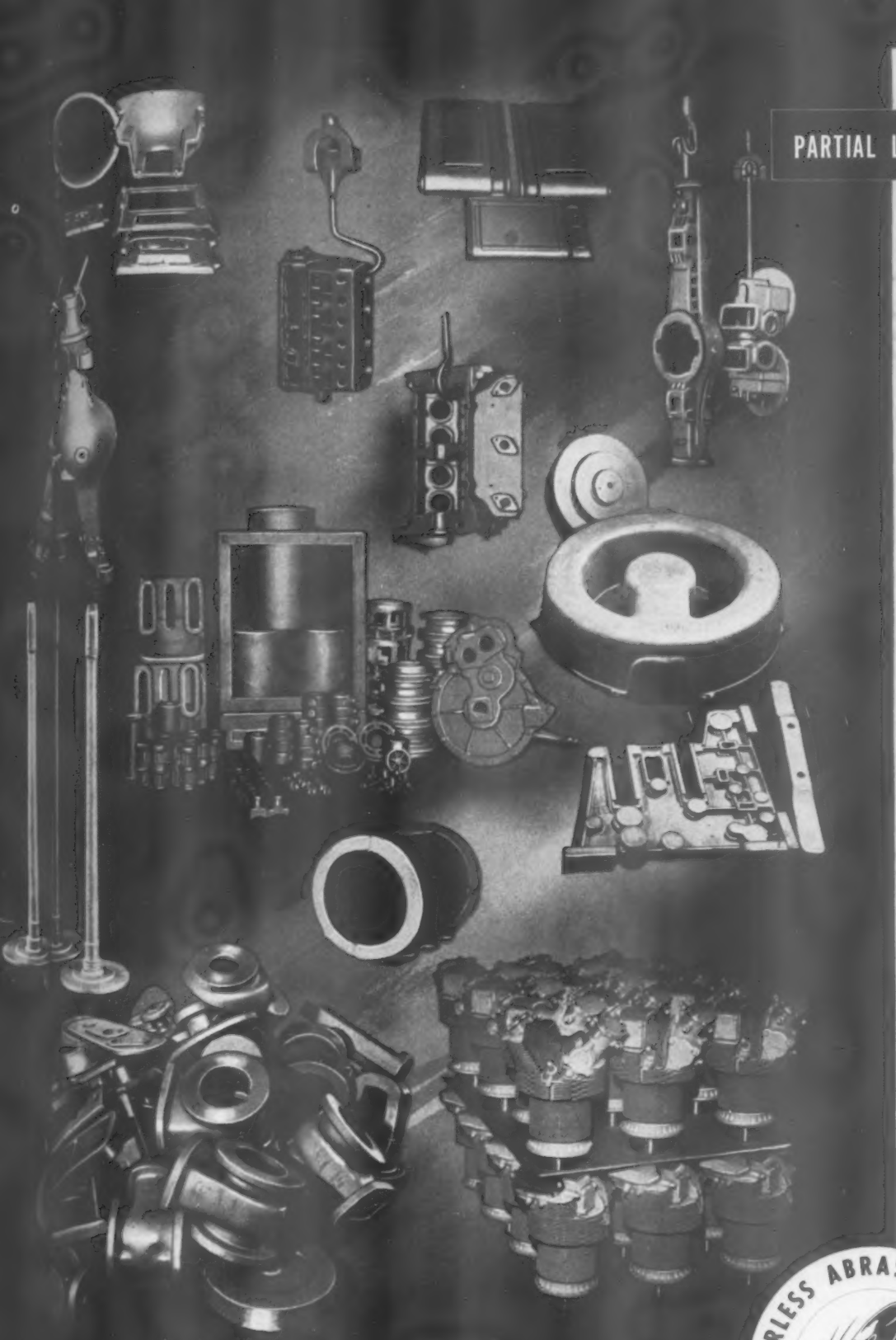
Made in eight standard sizes ranging from one cubic foot to 63 cubic feet capacity for cleaning loads in which individual pieces vary from a fraction of an ounce to over 1,000 lbs. each.

Wheelabrator Tables

Made in Plain Table and Multi-Rotary Table Types and in numerous standard sizes for cleaning flat or fragile work that is not adapted to tumbling.

Wheelabrator Special Cabinets

Cabinets are designed for special production requirements or where the work cannot be adapted to a standard machine. Examples: cylinder blocks, bathtubs, crankshafts, etc.



PARTIAL LIST OF PRODUCTS CLEANED

R. R. car wheels
Propeller blades
Propeller hubs
Bearings
Carburetors
Sheaves
Sprockets
Crankshafts
Steering knuckles
Bathtubs
Sanitary ware
Cylinder blocks
Radiator sections
Crankcases
Lathe beds
Axles and housings
Engine cases
Furnace castings
Brake drums
Stove iron
Meter cases
Permanent magnet
Tubing
Steel sheet
Valves
Pump housings
Bicycle parts
Billets
Connecting rods
Clutch springs
Zinc die castings
Chains
Fuel pumps
Gear cases
Engine castings
Motor frames
Transmitter cases
Generator parts
Camshafts
Cast iron pipe
Side frames
Gears
File blanks
Manifolds
Piston pins and rings
Shoe lasts
Lamp bases
Palnuts
Pinions
Bearing races
Coil springs
Locomotive flues
Truck wheels
Leaf springs
Pipe fittings
Pliers, wrenches

AIRLESS ABRASIVE BLAST CLEANING EQUIPMENT
AMERICAN

THE FOUNDRY IS A GOOD PLACE TO WORK

American

FOUNDRY EQUIPMENT CO.

505 S. BYRKIT ST. MISHAWAKA, INDIANA

WORLD'S LARGEST BUILDERS OF AIRLESS BLAST EQUIPMENT

(*Continued from page* 124)

at Chicago, as an office boy in 1920, later serving in various capacities until he was transferred to the molding room as assistant foreman in 1934. The following year he went to Detroit as molding room foreman, and in 1940 was assigned to Salt Lake City in the same capacity.

♦ ♦ ♦

J. H. McNulty, until recently senior inspecting officer of divisions operations in the United States for the Tanks and Mechanical Transport Division, United Kingdom and Canada, Ottawa, Ont., has been appointed works manager, Canada Electric Castings Ltd., Orillia, Ont. Mr. McNulty attended St. Catharines Collegiate Institute and Vocational School, St. Catharines, Ont., and completed a four-year course in engineering at General Motors Institute of Technology, Flint, Mich. From 1934 to 1940 he was associated with the Malleable Iron Foundry Division, McKinnon Industries Ltd., St. Catharines, Ont., as foreman of the annealing and casting processing departments and later as assistant to the foundry superintendent.

♦ ♦ ♦

Guy J. Coffey has been appointed vice president in charge of sales of the Chicago Pneumatic Tool Co., New York. Since 1939 he had been manager of the Los Angeles district office of that company. At one time Mr. Coffey was chief electrician of the Lima, O., plant of the Ohio Steel Foundry Co., and for 11 years starting in 1919 he was plant engineer of the Detroit Steel Casting Co. Following a short period with the Black & Decker Mfg. Co., he joined Chicago Pneumatic Tool Co. in 1933 as a salesman in the Philadelphia branch, next was advanced to the Cleveland office and subsequently to managership of the West coast office.

♦ ♦ ♦

Carl B. Johnson has been appointed assistant purchasing agent of the Symington-Gould Corp., Rochester, N. Y. Mr. Johnson joined the company in 1942 as works auditor at the Depew, N. Y., plant, and was transferred to Rochester early in 1944 as assistant to the works manager. Prior to going with Symington-Gould he was assistant purchasing agent of American Steel Foundries, Chicago. Mr. Johnson is secretary-treasurer of the Rochester Chapter of the AFA.

♦ ♦ ♦

Donald E. Webster, American Laundry Machinery Co., has been appointed a director of the Rochester Chapter of the AFA to fill the vacancy caused by the recent death of Ernest Van Billiard, Progressive Foundry Co. Mr. Webster formerly was secretary-treasurer of the chapter.

♦ ♦ ♦

Mahlon A. Combs has been appointed assistant secretary of the industrial and commercial gas section, **American Gas Association,** a newly-created post. A graduate of Stevens Institute of Technology, Mr. Combs has 25 years of experience in the gas industry. His most recent connection was the selection of sub-contractors for the production of ordnance products in the research and development department of American Type Founders Inc.

♦ ♦ ♦

Ralph N. Schaper, works manager, Fort Pitt Steel Casting Co., McKeesport, Pa., for the last five years, has been appointed assistant general manager of operations, Westlectric Castings Inc., East Los Angeles. Mr. Schaper served an apprenticeship in wood patternmaking at Sivyer Steel Casting Co., Milwaukee,

RALPH N. SCHAPER

after which he attended University of Wisconsin. He then worked successively at Sivyer Steel Casting Co., Pelton Steel Casting Co., Smith Steel Casting Co., Milwaukee, and Lebanon Steel Foundry Co., Lebanon, Pa.

♦ ♦ ♦

R. E. Walsh has been appointed assistant manager of the roll department, Continental Foundry & Machine Co., Pittsburgh. A graduate of the University of Chicago, Mr. Walsh joined Continental in 1936 and spent seven years in various capacities in the roll foundry before joining the sales organization. He will make his headquarters at Continental's Chicago Works, East Chicago, Ind.

♦ ♦ ♦

Earl B. Pridmore recently became associated with International Molding Machine Co., Chicago, as plant superintendent in charge of production. Mr. Pridmore attended Massachusetts Institute of Technology, and previously had been associated with the Pontiac and Buick divisions of General Motors Corp., with the former in the Detroit area and the latter in Chicago.

♦ ♦ ♦

N. A. Doolittle has been appointed representative for Ampco Metal Inc., Milwaukee, in Oklahoma, Southern Kansas and Southwestern Missouri, for the sale of metal castings and other bronze specialties, with headquarters in Tulsa, Okla. **W. W. Swan** has been assigned a number of counties in southeastern Texas in addition to his former territory comprising Louisiana, Alabama and Mississippi.

♦ ♦ ♦

William T. Kelly Jr., executive vice president of the Kellogg Division, American Brake Shoe Co., New York since 1944, has been elected president of that division. In 1929 Mr. Kelly was transferred from National Bearing Metals Corp., a subsidiary, to the purchasing department of American Brake Shoe. He became general purchasing agent in 1940, a position he continues to hold. **J. F. Weller,** formerly president of the Kellogg Division, has been appointed director of automotive sales.

♦ ♦ ♦

Dr. Lloyd M. Joshel has been appointed general purchasing agent, the Velsicol Corp., Chicago. Dr. Joshel was associated with the Chemicals Bureau, War Production Board from 1942 until recently. A graduate of University of Illinois, he received his Ph. D. at Ohio State University and subsequently was appointed a research chemist for the U. S. Department of Agriculture.

♦ ♦ ♦

Col. John Slezak, chief of the Chicago Ordnance District, recently was awarded the Legion of Merit for his development of a production forecasting control which assisted the general staff in strategic planning of offensive action. When called to active duty in 1942, Colonel Slezak was president, Turner Brass Works, Sycamore, Ill.

♦ ♦ ♦

Albert Baron, assistant purchasing agent at the Whiting, Ind., plant, Federated Metals Division, American Smelting and Refining Co., for the last year, has been appointed purchasing agent at that plant. Mr. Baron had been associated with Federated at New York and Detroit since 1928.

♦ ♦ ♦

Harley C. Lee, recently in charge of the technical department, Basic Magnesium Inc., a former subsidiary of Basic Refractories Inc., Cleveland, has rejoined the latter company as vice president and technical director.

♦ ♦ ♦

Joe Sheeketski has been granted a three-months' leave of absence from his sales position with the Peninsular Grinding Wheel Co., Detroit, to become backfield coach at Notre Dame University.

♦ ♦ ♦

Herbert F. Scobie has left the University of Minnesota to join the national office staff of the American Foundrymen's Association in educational and promotional work.

♦ ♦ ♦

Dr. Harry G. Mitchell, carbon products consultant, War Production Board, since 1942, has returned to the Speer

(*Concluded on page* 130)

Philco "Thirty" Industrial Truck Storage Battery gives 30% longer life and is identified by its distinctive red connectors.

FOR 50 YEARS A LEADER IN INDUSTRIAL STORAGE BATTERY DEVELOPMENT

Tune in The Radio Hall of Fame, with Paul Whiteman and His Orchestra, Sundays, 6 P. M., EST; The Breakfast Club with Don McNeill, 9:45 A. M., EST, Monday through Friday—ABC (Blue) Network (Coast to Coast).

MODERN ELECTRIC INDUSTRIAL TRUCKS POWERED BY COST-SAVING PHILCO "THIRTY" STORAGE BATTERIES

Now you can get the kind of industrial trucks war experience proved the safest, most flexible and maintenance-free — ELECTRIC TRUCKS! And you can power your trucks with the greatest materials handling development since the fork-lift truck, itself—PHILCO "THIRTY", the Storage Battery with 30% longer life! Plan now for the big demands peace-time production will place on your materials handling equipment. Philco "Thirty" will give your trucks top capacity, *plus* savings in maintenance, depreciation and replacements. Write today for new catalogs giving specifications.

PHILCO CORPORATION · STORAGE BATTERY DIVISION · TRENTON 7, NEW JERSEY

PHILCO *Famous for Quality the World Over*

(*Concluded from page* 128)

Carbon Co. and its affiliate, the International Graphite & Electrode Corp., St. Marys, Pa., as advertising manager for both organizations.

♦ ♦ ♦

R. Bruce Rogers, until recently car foreman, American Refrigerator Transit Co., St. Louis, has been appointed works manager in charge of production, Mt. Vernon Car Mfg. Co., Mt. Vernon, Ill.

♦ ♦ ♦

Dr. Francis C. Frary, director of research, Aluminum Co. of America, has been elected to receive the Perkin medal of the American Section of the Society of Chemical Industry. The presentation, to take place at a dinner meeting of the society in New York, Jan. 11, will be in recognition of Dr. Frary's outstanding accomplishments in the field of industrial research.

♦ ♦ ♦

George A. Pagonis has resigned as superintendent of the magnesium sand casting foundry, Permanente Metals Corp., Permanente, Calif., to become manager of the permanent mold and magnesium sand casting foundries, Clarkson Co., Belmont, Calif., recently acquired from Dalmo Victor Inc., that city.

♦ ♦ ♦

G. H. Kann, president, Pittsburgh Crushed Steel Co., Pittsburgh, and subsidiary companies, has been elected a member of the board of directors of the Foundry Equipment Manufacturers Association, replacing **M. F. Becker,** who recently resigned.

GRAY IRON CASTINGS

Survive Atomic Bomb Blast

By A. J. EDGAR
Technical Advisor
Gray Iron Founders' Society
Washington

IN THE rubbish of atom-bombed Hiroshima, Associated Press photographers came upon familiar cast iron radiators. Surprised, perhaps, to find anything of original form in that devastated, desolate area, they photographed them and, provided graphic evidence that gray cast iron has survived disintegration bombing.

Close study of the AP wirephoto does not indicate that the bombed-out radiators were damaged in the least. There is no apparent crushing, shattering, warping or distortion, no fusion or melting, no sign of breakage or cracking; the radiators appear to be as perfect as they were the day they were molded. Yet, around them everything is in ruins, smashed, twisted, mangled, pulverized—mute evidence of the terrific blasting power of the atomic bomb.

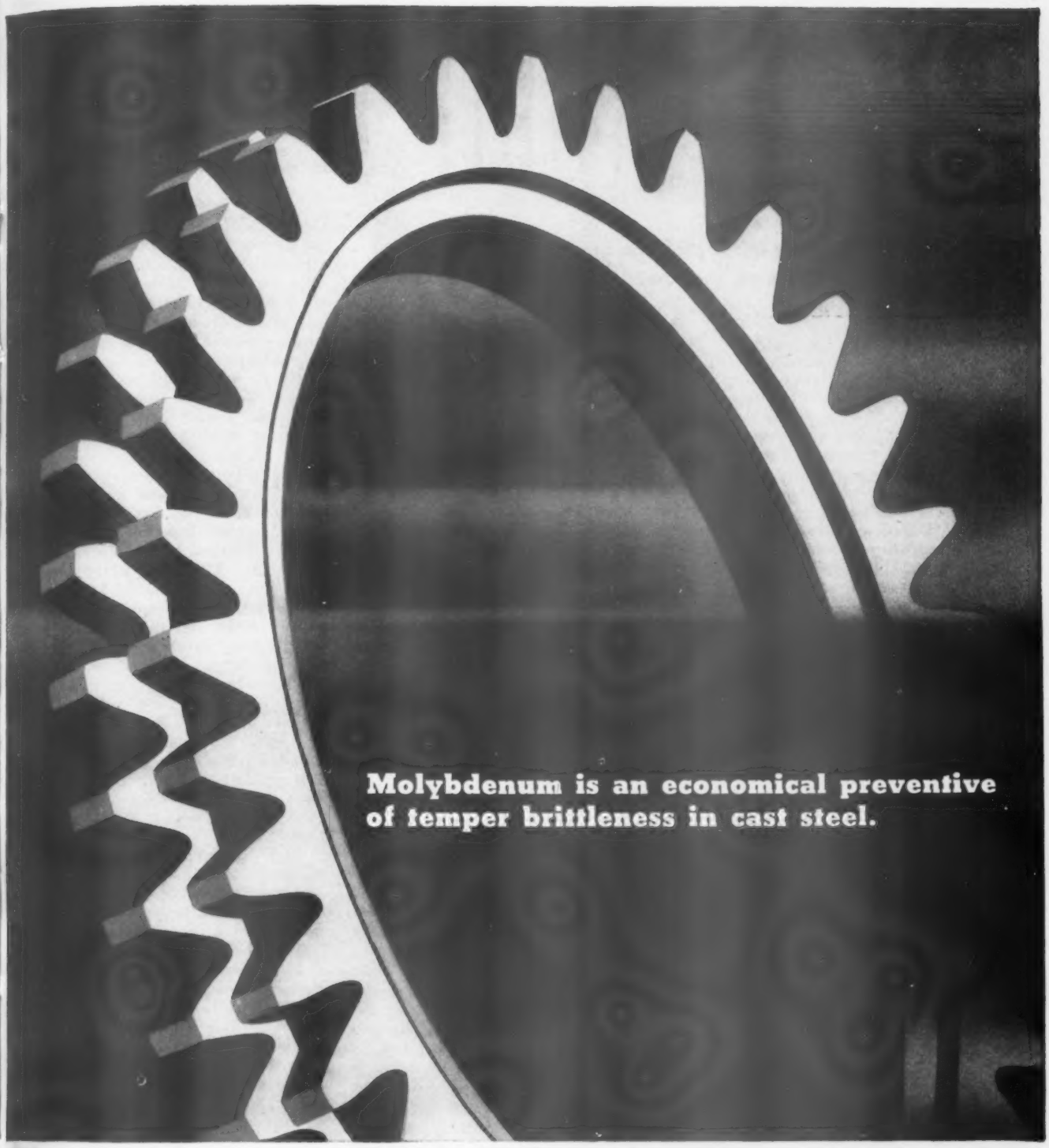
The fusion, into a green, glassy coating, of the high-silica soil of the bomb test area in New Mexico testifies to the searing temperatures, estimated at millions of degrees, developed by the explosion. Since gray iron melts at about 2150F, it is probable that the radiators were not within the radius of the extreme temperatures, or were otherwise protected.

The photograph evidences, however, that the radiators were within the field of the enormous pressure, shock and vibration generated by the searing blast, since all around them is flattened rubble. One possible explanation for the fact that they escaped destruction is the great capacity of gray iron to absorb vibration.

Gray cast iron is commonly regarded as a brittle material with little or no ability to withstand shock. It is argued that it pulverizes when subjected to the action of a high explosive, and that it lacks the qualities necessary to withstand the rigors of war. In that rubble-strewn section of Hiroshima, however, gray cast iron radiators appear to be the only structures that withstood the most powerful blast ever loosed by man upon the earth.

The fact that gray iron radiators escaped disintegration, distortion or apparent fracture when the atomic bomb fell on Hiroshima may simply have been a fortunate circumstance. Those who regard gray iron as a weak, unreliable material will think so. I am convinced, however, that the bombing of Hiroshima demonstrated that gray iron has unique properties which are as yet unknown or only partially evaluated.

Gray cast iron radiators escaped disintegration as the atom bomb reduced this section of Hiroshima to a mass of flattened, twisted rubble. *(Associated Press Wirephoto)*



CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.

ARMY E NAVY

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500 Fifth Avenue · New York City

MOLY

Around DETROIT

BY A. H. ALLEN
Detroit Editor, The Foundry

Foundries, hard hit by labor shortage in midst of thousands of disemployed war workers, may need real promotion effort to attract talent and skill back to plants

TO A GREATER degree than in other lines of industry, foundries in this area are experiencing the anomaly of a crippling shortage of help in the midst of thousands disemployed by termination of war contracts. Concerted efforts to locate molders, coremakers and semiskilled help go begging as foundry production moves into higher gear in anticipation of accelerated schedules for automobile assemblies, already delayed about six weeks by strikes and other interruptions in suppliers' plants.

The answer is not hard to find. Many thousands laid off when war plants skidded to a stop are refusing to take jobs at lower rates of pay or even at lower levels of comfort and cleanliness with the same pay. They are fairly well heeled with war bond savings, and a state treasury bursting with unemployment-compensation millions stands ready to guarantee them up to $20 a week for 26 weeks, per individual. Combination of the two permits many to take it easy for a while, and in the meantime they can watch and see what happens to union demands for a "30 per cent or else" boost in base wage rates.

Sooner or later it seems fairly obvious these idlers will have to take a hitch in their belts and get back to work, and while the immediate outlook is discouraging, there is no inclination on the part of managements to despair of a solution. It is perhaps a natural aftermath of an all-out war production program that may require several months to be washed out. The difficulty is that in foundries the situation is accentuated and they may be among the last to be restaffed when the economic level of the nation simmers down to whatever the normal plane is going to be.

Some observers are of the opinion it may be a good thing for state unemployment compensation funds to be disbursed rapidly now, to avoid them becoming political footballs some time in the future. Of course, in the sense that they represent payments for work not performed, they contribute to an inflationary trend, but this reasoning is not strictly true, since the funds have been built up in part at least by deductions from workers' wages while they were employed.

There is a considerable cross section of opinion in the foundry field that the industry is going to have to launch a real promotion effort if it is ever to attract talent and skill back to its plants.

Attract Young Men To Foundry

Such promotion will take the form of education of men now in foundry work, along with strenuous efforts to interest younger men at the high school and trade school level to choose foundry careers.

Those behind this effort feel that many working people who, during the war, moved out of foundries and into machine shops and other departments never will return to their former jobs, thus necessitating recruitment of new talent. This may be true, but cold logic forces the conclusion that there will not be enough jobs in the machining field, for example, to accommodate anywhere near the number employed during the war years, so what is more natural than for the ex-foundrymen to gravitate back to their old jobs? This may be specious reasoning or wishful thinking, still there has not been time yet for economic forces to demonstrate its truth, so it cannot be dismissed idly.

As of Oct. 15, a reasonably good start had been made on assemblies by Ford, Hudson, Pontiac, Buick, Chevrolet, Willys and Nash, with the others not far behind. As stated before, it was the original plan to have cars rolling long before this date, and foundry schedules accordingly had been based on good floats through the machine shops. Delays thereby have slackened the pressure somewhat on castings departments, al-

(*Concluded on page* 135)

Additional Details on Chemically Treated Sand

ALTHOUGH it is not yet possible to disclose either the name of the inventor of the chemically treated sand process, first announced in this column last month, or the location of the experimental and, more recently, production tests made of this process, some additional details are available. These will illustrate more clearly the amount of work done on the problem and how radically the process differs from present practice.

The original announcement covered only the initial object of the research, that is, the carbon coating of sand grains to the end that they would be nonoxidizing without the addition of any extraneous material. Although extensive tests showed this method to be highly effective, it also revealed the fact that the effectiveness of any method to offset the action of oxygen was directly proportionate to the amount of oxygen present. In that water in the mold was found to be the most prolific source of such oxygen, further work was undertaken to eliminate if possible the use of water in molding. To this end the method devised for coating the sand grain with carbon and the coating so produced was amplified to make it possible to bond the sand by the surface adhesion of the coated grains. Thus, although this chemically treated sand uses no water and so has the properties of dry sand, it produces under pressure a good "green" bond.

As the molten metal transfers its heat to the mold, a physical change in the coating and its adhesion produces the necessary hot strength, while the further rise in temperature, particularly at and near the surface of the mold and in the presence of oxygen, converts it to an inert gas.

Two contradictory problems had to be met in the development of the process: First, the production of a compound which would produce adhesion without at any time becoming sticky, in order to provide a continuous free-flowing system; second, in the interests of economy, the compound had to change physically to meet various progressive requirements while at the same time retaining its original chemical composition so that it could be reused repeatedly until it was finally lost as a gas in combination with oxygen. Attention was even given to a minimizing the contamination of the system, and thus the purity of the compound has been held to less than 0.5% ash when volatilized.

Further experimental work has been completed on converting the initial physical bond, utilized in making a mold, into a plasticized fusion, so that the sand can be used for the production of cores which will have the same inert properties as the mold. When production tests are completed on this phase, it is anticipated that both sand systems can be combined and that it will thus be possible to use this chemically treated sand continuously and interchangeably for the production of either cores or molds.

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Scale Free Annealing Castings.
40,000 lbs. of castings per day are annealed, scale-free, in the above EF continuous special atmosphere short cycle annealing installation.

Heat Treating Large Castings
Railroad castings, heavy tank castings and other large parts and products are annealed or heated and quenched in EF furnaces similar to above.

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Electric and Fuel Fired
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FURNACES
FOR
Annealing Castings
Designed and Built by
The Electric Furnace Co.
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Furnaces for Every Industrial Heating Process
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Aluminum, Magnesium
and other non-ferrous and ferrous castings are uniformly heated in EF pits and other continuous and batch type units.

Large Alloy Castings
Charging end of a large EF oil-fired roller hearth furnace annealing large castings—continuously.

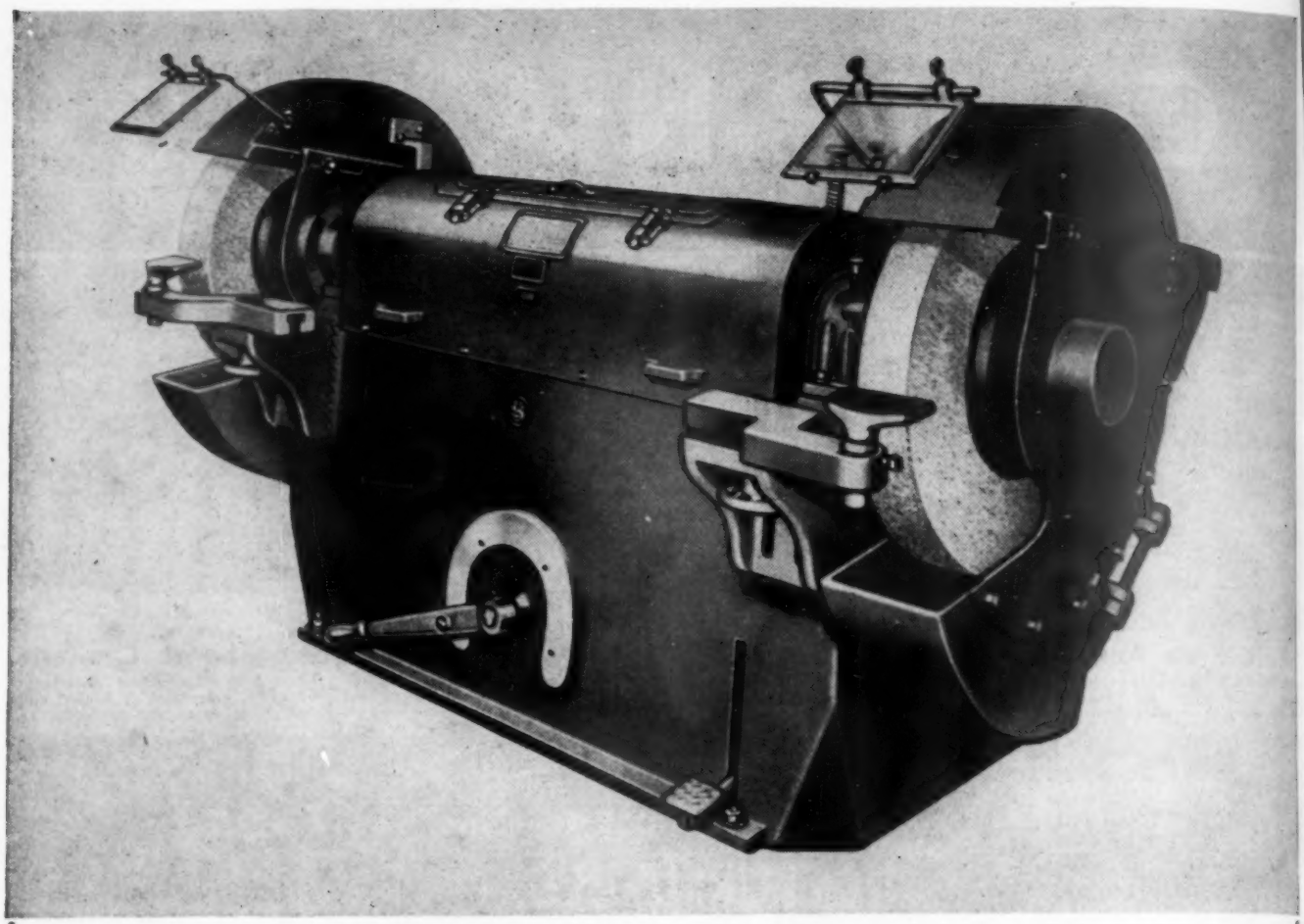
Steel Castings An EF car type installation consisting of two heating chambers, a cooling chamber, car puller and cross transfer car, for annealing large steel castings.

Car Bottom Furnaces. EF car type furnaces are built in any size, with single chambers, multiple chambers with cross transfer car, or with quenching means as required.

Additional data on these and other types of EF Production Furnaces sent on request.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production



BACK IN "CIVVIES"
UNITED STATES ELECTRICAL TOOLS

IT's saying "hello" to an old pal who's been hard to find for the past three or four years . . . and we appreciate your indulgence. But UNITED STATES ELECTRICAL TOOLS have been working for Uncle Sam . . . and now they're back on the job for the millions of his "nevvews" who are on their toes and straining every muscle to turn out "the mostest and bestest for the leastest."

HEAVY DUTY SNAGGING GRINDERS

MODEL 69 . . . FULL SERVICE FROM THE WHEELS UNTIL THEY'RE WORN 'WAY DOWN through the variable speed which enables the operator to maintain full peripheral speed through semi-enclosed, constantly lubricated gear reduction. And note this: it is impossible to increase speed unless wheels are worn down sufficiently to justify speed change. One-piece chrome-manganese grinding wheel spindle supported by four heavy-duty ball bearings in dustproof housing, protected inside and out by labyrinth seals.

"Thanks a Million"

And that's from the heart . . . you've been wonderful all through the war years. The UNITED STATES re-conversion program is complete and we're right back into production. Send your orders . . . your distributor can supply you.

THE United States ELECTRICAL TOOL CO.
CINCINNATI 14, OHIO

(*Concluded from page* 132)

though assemblies will be caught up before many weeks have elapsed.

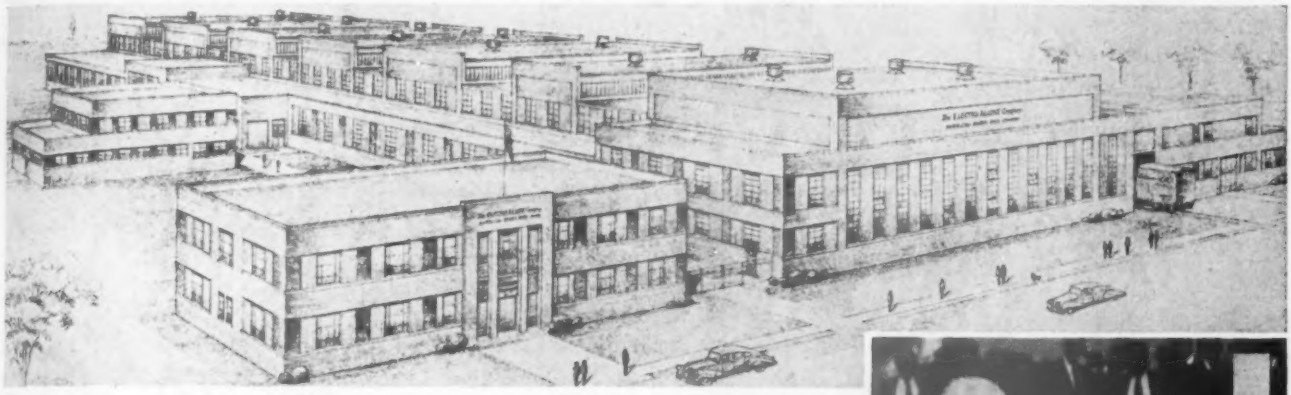
In addition to those mentioned as being in production, new car announcements have been made by Olds, Cadillac, Studebaker, Mercury and Lincoln. As yet nothing has been heard from the Chrysler lines, nor from Packard, but they are both on the verge, so to speak. The Packard foundry is busy on castings for new models, as well as on a substantial program for replacement parts and a clean-up on some work for Caterpillar Tractor.

Now that the pattern of 1941 production has been re-established in many shops, superintendents are getting the opportunity to compare cost sheets with those of four years ago, and the figures are shocking, to say the least. Scrap is up, productivity and efficiency are off as much as 50 or 60 per cent, and burdens such as materials handling are in some cases double. This is a decidedly unhealthy situation, particularly when it is coupled with demands for a 30 per cent hike in wages and efforts to hold down retail automobile prices to somewhere near the 1942 level. Granted that operations at a loss can be supported for a time at the start, eventually some kind of a balance will have to be struck.

The loudest complaints heard from foundry managers these days are on the score of the alarming drop in productivity. They say some sort of wage increase might be absorbed if there were some assurance of a return to 1941 productivity, but they see little likelihood of that.

One of the most far-reaching shakeups to hit any large organization has been carried out quietly over the past month at Ford Motor Co. Starting with the retirement of Harry H. Bennett as director of administration (and many other things as well), the reshuffling filtered on down through the Ford administrative staff, with nearly all men formerly closely associated with Bennett leaving. They include Ray R. Rausch, who shared direction of production with M. L. Bricker. The latter is now in charge of all productive and nonproductive manufacturing, including the several Ford foundries which presumably will continue under the more immediate supervision of R. H. McCaroll, executive engineer.

The realignment was instigated and directed by 29-year-old Henry Ford II, who has now taken over the presidency of the company from his grandfather to permit the latter's virtual full retirement. The tipoff around Detroit is to watch the younger Ford for an early announcement of some revolutionary new technique in labor-management relations, perhaps equalling in impact the bombshells initiated by the elder Ford in the form of the $5 and $7 daily wage. Speculation is rife as to what form the new announcement may take—perhaps some variation of profit-sharing, incentive systems, or participation in ownership. The younger Ford has made the statement that $50 a day is not too high a wage if it yields an equivalent amount of production, but that $1 a day is too high if it does not produce a dollar's worth of productivity.



WORK IS STARTED

On Large Alloy Foundry

GROUND was broken Sept. 27 for the first large foundry to be built in this country since V-J-Day when the Electro-Alloys Division of American Brake Shoe Co. started work on a $2,500,000 program at Elyria, O., that will quadruple the company's existing casting facilities there. Tony Whitman, a grinder, who has the longest service record at the plant, and William B. Given Jr., president, American Brake Shoe Co., turned over the first spadefuls in the project that includes a completely new foundry, office building and employes' building.

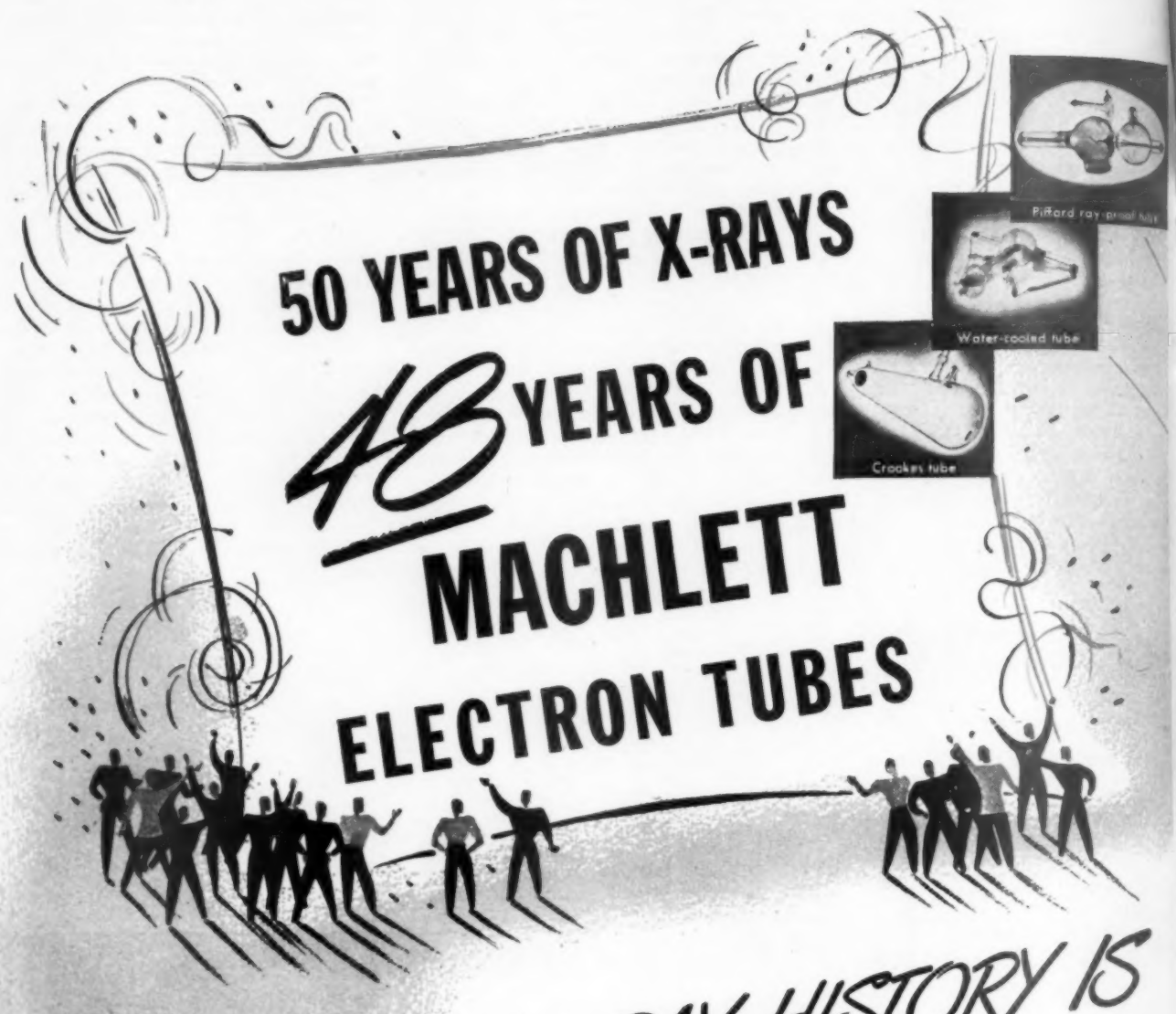
To Employ 300 Workers

The new 200 x 460 ft foundry, which will have 300 workers when operating at capacity, compared with 100 at present, will also accommodate production of alloy castings formerly handled by American Manganese Steel Division, Chicago Heights, Ill. Principal equipment to be installed includes three induction and three electric arc melting furnaces, sand conditioning and handling equipment, 15 molding machines, mold and core ovens, sandslinger, heat treating furnaces, and centrifugal casting machines. Additional x-ray equipment will be added to that already installed. Sand testing, chemical and physical laboratories will be located in the foundry.

The two-story employes' building will contain a lunch room and shower and locker facilities, while a new boiler room makes the fourth unit in this expansion program. The new foundry will be east of the present one and attached to it. The existing foundry will be converted into a cleaning room, and the existing cleaning room will be used as a maintenance and pattern shop, with facilities for additional pattern storage.

Electro-Alloys became a division of American Brake Shoe by purchase in August, 1943. Its products are heat and corrosion resistant alloy castings, sold under the trade name Thermalloy.

William B. Given Jr., president, American Brake Shoe Co., wields the shovel as work starts on new foundry project for company's Electro Alloys Division at Elyria, O. Architect's sketch of new plant shown at top



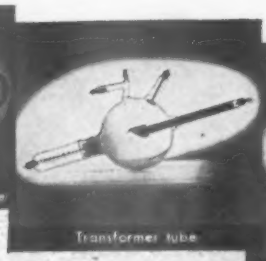
IT WAS 50 YEARS AGO, on November 8, 1895, that scientific investigation led Roentgen to the discovery of X-rays. In this semi-centennial year we honor his work, and the work of the pioneers who, sometimes at the sacrifice of their own lives, developed the theory and practice of a science that today means so much to all mankind.

Very soon after Roentgen publicly announced his discovery in 1896, Robert H. Machlett made the first practical American X-ray tube. Quickly he improved his techniques, creating a whole series of "firsts" such as the first ray-proof tube, the first cooled by water, the first for contact therapy. The organization he founded carries on his principle of constant research, improvement and initiative, and has many other firsts to its credit, culminating in the amazing and unique 2,000,000-volt, direct current, sealed-off, precision X-ray tube.

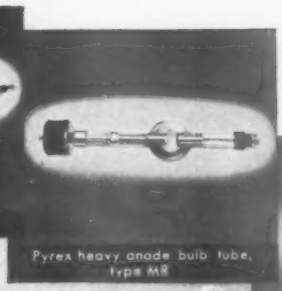
To a large extent, X-ray history is Machlett history, a history of service to mankind. Today, Machlett tubes are in use by doctors, hospitals, laboratories and factories in many parts of the world, saving lives, inspecting products, performing delicate analyses, expanding man's knowledge, serving with unmatched exactitude and economy. For the future, Machlett's talents will create other and still more valuable applications, for Machlett never stands still, is always creative, improving its tubes, developing new ones for old and new services.

In addition to X-ray tubes for all purposes, we also make oscillators, amplifiers and rectifiers for radio and industrial uses, all to the same high (and unmatched) standards to which our X-ray tubes are held. It will pay you to buy Machlett tubes. For information as to the available types, write Machlett Laboratories, Inc., Springdale, Connecticut.

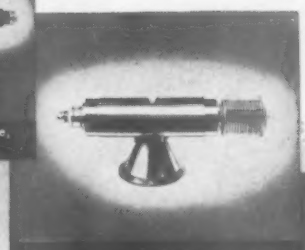
Cornell contact therapy tube



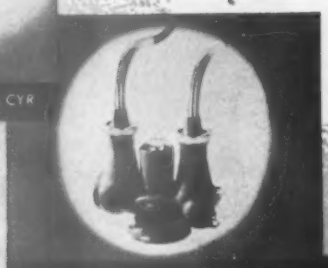
Transformer tube



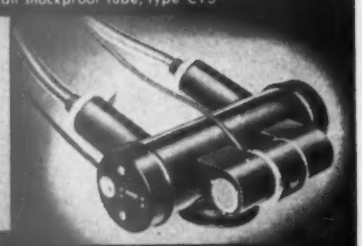
Pyrex heavy anode bulb tube, type MR



Compact ray-proof tube, type CYR



Small shockproof tube, type CYS



Silver bearing long-life rotating target tube, type DX

Tube with beryllium window and hooded anode, 250 k. v., type IR

Tube with vacuum-tight beryllium window envelope—the Diffraction Tube

first MACHLETT HISTORY!

From the Beginning

"When in 1895 Professor Roentgen announced his discovery, Machlett was immediately interested and began experiments to reproduce the results of Roentgen. He was ideally equipped for such work, for just at that time he had perfected a mercury pump capable of producing a very high vacuum. He attacked the difficult task and before many days had passed, succeeded in producing the first X-ray tube in this country."—I. S. Hirsch, *Radiology* 8:254, 1927.

2,000,000 volt direct current precision radiographic tube, type VM

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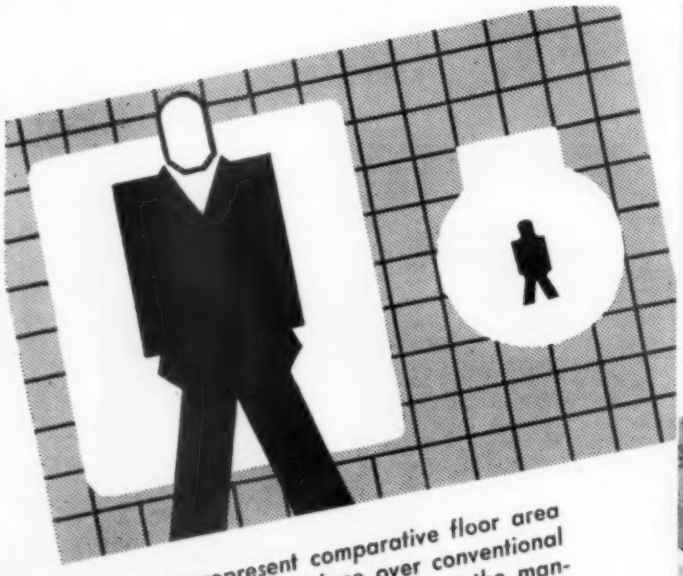

White areas represent comparative floor area saved by the Super-Cyclone over conventional type furnace. The figures represent the man-power savings achieved by the Super-Cyclone.

Super-Cyclone

TRIPLES HEAT TREATING CAPACITY STEPS UP HANDLING EFFICIENCY

The Lindberg Super-Cyclone Furnace handles the same or greatly increased production in 1/3 the floor area. This statement is borne out by conservative averages of what the Super-Cyclone has already done in many plants.

The revolutionary 100% forced convection heating principle employed to build temperature to 1700° F. handles even the heaviest loads with rapid uniformity. This is attained by driving accurately heated air through the load at high velocity. Distortion due to radiant heat is eliminated —and many production increases of from 200% to 1000% are already on record.

Shown above is a heavy load of railroad frogs in the time- and work-saving Super-Cyclone fixture. Once loaded, parts are not handled again until the heating cycle is completed. Fixture can be loaded and unloaded away from furnaces—operator is not subject to high heat as with ordinary box furnace.

With an operating range up to 1700° F., the Super-Cyclone is employed for normalizing, annealing, hardening and tempering. Write for complete information today!

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SUPER-CYCLONE for hardening, normalizing, annealing, tempering
CYCLONE for accurate, low-cost tempering and nitriding
HYDRYZING for scale-free and decarb-free hardening

DETERMINING WEIGHTS OF CASTINGS FROM BLUE PRINT DATA

(Concluded from October)

Sections F_1 and F_2 constitute the second web or mross member uniting the two ends of the casting. This section is divided in the center by the cylinder E, hence the necessity of estimating separately the content of the two units F_1 and F_2. Section F_1 $\frac{7}{16}$-in. wide and ¼-in. thick, measures 1⅛-in. along one side and $\frac{31}{32}$-in. long the other side, that is along the side of the cylinder E. The intersecting web D cuts $\frac{3}{32}$-in. from each side since D already has been estimated as a continuous member. The length 1⅛—$\frac{3}{32}$-in. becomes 0.6875. Result of adding these two lengths and dividing by 2 is 0.7656. Formula for section F_1 then appears as 0.7656 x 0.4375 x 0.25 = 0.083 cu in.

The same procedure is followed in section F_2 where $\frac{3}{32}$-in. is deducted from the two sides which are $\frac{31}{32}$ and ⅝-in. respectively in length. The result divided by 2 (or multiplied by ½) is 0.4215. Therefore the cubical content of F_2 is 0.4215 x 0.4375 x 0.25 = 0.046 cu in.

Set down in tabular form for the result of the various calculations may be grasped more readily:

A — 1.75 × 1.125 × 0.4375		0.862
B — S = 0.75² × 196° × 0.00873 × 0.4375	0.422	
Minus cb = 0.50 × 1.125 × 0.4375	0.246	0.176
C — 0.625 × 1.00 × 0.25		0.156
D — 1.375 × 1.25 × 0.25	0.430	
D_1 — Minus 0.50² × 0.785 × 0.2813	0.055	0.375
E — 0.1875 × 0.785 × 0.875		0.129
F_1 — 0.7656 × 0.4375 × 0.25		0.083
F_2 — 0.4215 × 0.4374 × 0.25		0.046
Total cubic inches		1.827
Weight cubic inch cast iron		0.26
Estimated weight of casting		0.4750
Plus 10 per cent, fillets, draft, etc.		0.0475
Final estimated weight		0.52 lb

In the previous example the weight of a cubic inch of cast iron was given, and to determine casting weights in other alloys the following may be used:

Red brass, leaded red brass, tin bronze	0.315
Leaded tin bronze	0.335
Yellow brass, leaded yellow brass	0.305
Manganese bronze	0.288
Aluminum bronze	0.270
Aluminum-copper	0.103
Aluminum-silicon	0.096

SPECIFIC GRAVITY AND DENSITY OF COMMON CASTING ALLOYS

Casting Alloy	Specific Gravity	Weight per cu in.
Gray Cast Iron	7.14	0.258
Malleable Iron		
ASTM Grade 35018	7.20-7.45	0.260-0.269
ASTM Grade 32510	7.25-7.34	0.262-0.265
Cupola	7.10-7.20	0.256-0.260
Steel		
Low carbon	7.86	0.284
Medium carbon	7.86	0.284
High carbon	7.8-7.86	0.282-0.284
Low alloy	7.8	0.284
High alloy	7.5-8.1	0.271-0.293
Aluminum-base Alloys		
Al-Cu (non-heat treatable)	2.83-2.91	0.102-0.105
Al-Cu (heat treatable)	2.77-2.87	0.100-0.104
Al-Si	2.64-2.71	0.095-0.098
Al-Cu-Si	2.75-2.80	0.099-0.101
Al-Mg	2.64	0.095
Al-Zn	2.80-2.94	0.101-0.106
Al-Si-Cu-Mg-Ni	2.69	0.097
Al-Cu-Mg-Ni	2.75	0.099
Magnesium-base Alloys	1.80	0.065
Zinc-base Alloys	6.7	0.242
High-nickel Alloys	8.7	0.314
Copper-base Alloys		
High-copper	8.8	0.318
Leaded tin bronze	8.89-9.70	0.321-0.350
Leaded red brass, red brass, tin bronze	8.61-8.89	0.311-0.321
Manganese brone	7.70-8.0	0.278-0.289
Nickel brass, leaded Ni brass	8.75-8.92	0.316-0.322
Yellow brass, leaded yellow brass	8.31-8.56	0.300-0.309
Aluminum bronze	7.31-7.65	0.264-0.276
Silicon bronze	8.23-8.45	0.297-0.305

MELTING POINTS OF VARIOUS MATERIALS USED IN THE FOUNDRY

Material	Melting Point F	Remarks
Alumina	3725	
Aluminum	1218	
Aluminum bronze	1908	
Bauxite	3308	
Brass (67 Cu-33 Zn)	1725	
Bronze (90 Cu-10 Sn)	1850	
Calcium	1490	
Calcium-manganese-silicon	1830-2000	16-20 Ca, 14-18 Mn, 55-60 Si
Calcium-silicon	1850-2100	28-35 Ca, 60-65 Si, 3-6 Fe
Carbon	Infusible	
Cast iron	2065-2400	
Chromite (FeO, Cr_2O_3)	3950	Also chrome brick
Chromium	2930	
Copper	1981	
Copper-aluminum	1070	50 Cu, 50 Al
Dolomite		Dissociates at high temperatures
Ferrochromium	2200-2370	60-72 Cr, 4-8 C, 2-3 Si
Ferrochromium (low C)	2300-2480	60-72 Cr, 0.6-2 C, 2-3 Si
Ferromanganese	2280-2325	78-82 Mn, 6-8 C, 1 Si
Ferromolybdenum	2800-2850	55-65 Mo, 0.5-2 C
Ferrophosphorus	2300	17-25 P
Ferrosilicon (15 Si)	2180 approx.	
Ferrosilicon (50 Si)	2170 approx.	
Ferrosilicon (75 Si)	2150 approx.	
Ferrosilicon (90 Si)	2150 approx.	
Ferrotitanium	2650	17 Ti, 7.5 C, 2.5 Si
Ferrotungsten	3275-3450	78-83 Wo, 1 C
Ferrovanadium	2280-2550	35-40 V, 1.5-8 Si, 0.2-3 C
Firebrick	2800-3100	
Fluorspar		Decomposes at high temperature
Fireclay	2730-3150	
Ganister	2550	98 SiO_2

Material	Melting Point F	Remarks
Iron (pure)	2786	
Iron ore (Fe_2O_3)	2805	
Iron ore (Fe_3O_4)	2800	
Lead	618	
Lime (CaO)		Decomposes at high temperature
Magnesia (periclase)	5070	
Magnesite	3990-5070	Also magnesite brick
Magnesium	1200	
Malleable iron	2375-2575	
Manganese	2246	
Molybdenum	4620	
Nickel	2640	
Nickel, F grade	2275-2350	
Nickel-chromium-copper (pig)	2300	58 Ni, 8 Cr, 24.5 Cu, Rem. Fe
Phosphorus	111	
Pig iron	2066-2300	
Sand	2900-3100	
Silica	3100	Also silica brick
Silicon-manganese	2250	65-70 Mn, 20-25 Si, 1 C
Silicon	2588	
Silicon-aluminum	1920	50 Si, 50 Al
Sillimanite (Al_2O_3, SiO_2)	3290	
Spiegeleisen	1950-2265	15-30 Mn, 4.5-5 C, Rem. Fe
Steel	2500-2775	
Sulphur	248	
Tin	450	
Titanium	3272	
Tungsten	6152	
Vanadium	3128	
Zinc	787	
Zircon (flour and sand)	3812 approx.	
Zirconium	3090	

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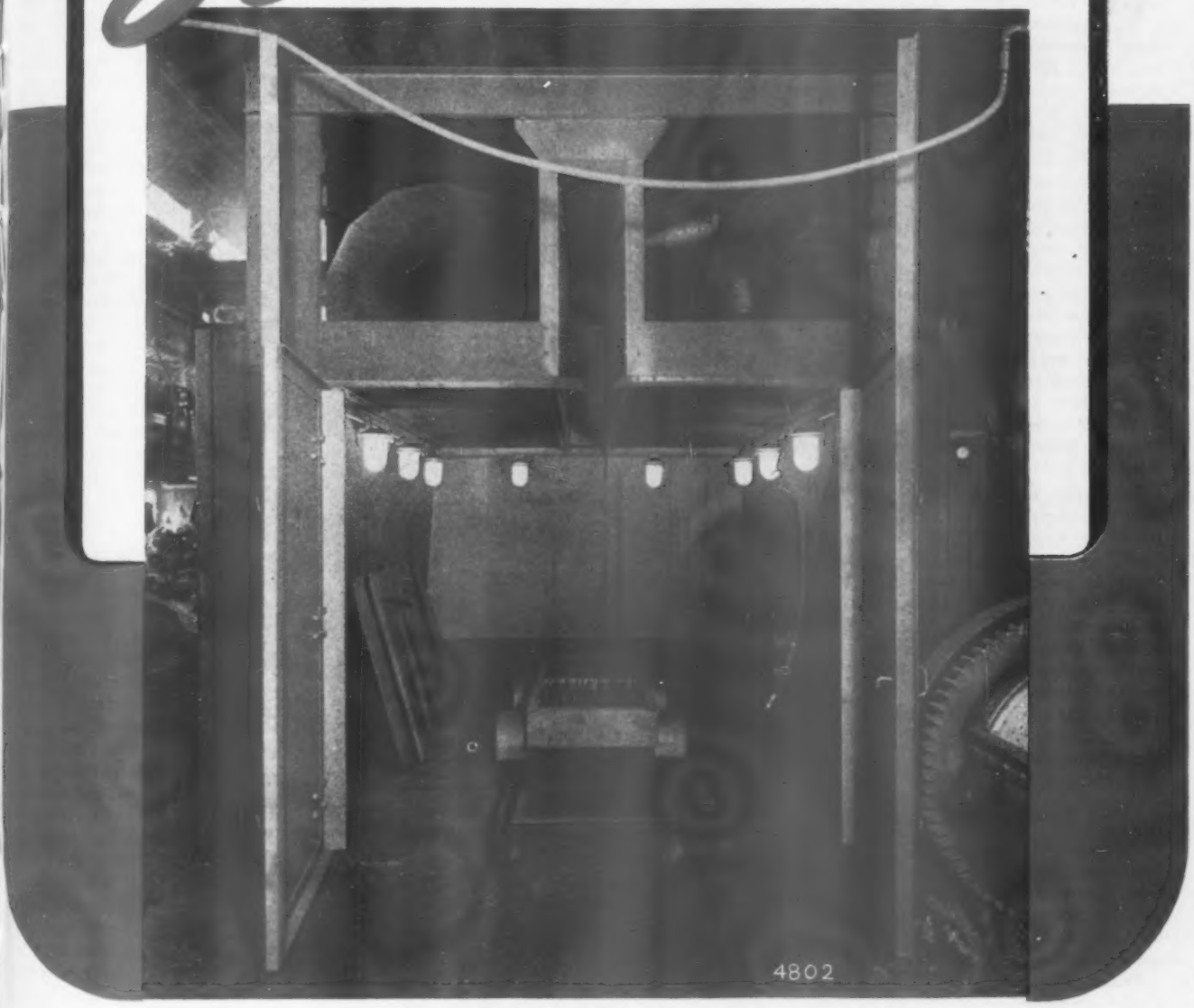

A typical Sly Blast Room for a jobbing foundry

Castings of moderate weight are placed against the sidewall for cleaning as shown; heavier castings are handled on the car. Provision has also been made for future installation of a monorail.

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MAGNESIUM ASSOCIATION

Sees Broad Peacetime Markets

WHILE magnesium demand experienced a sharp drop with the ending of the war, much can be done in developing the peacetime usefulness of this alloy, speakers declared at the second annual meeting of the Magnesium Association at the Waldorf-Astoria Hotel, New York, Oct. 2-3.

President E. S. Christiansen referred to many applications now either on the drawing boards or in actual production. "Commercially," he said, "power will be conserved through such applications as elevator cages; the pay loads of trucks, buses, airplanes and railroad cars will be greatly increased; the efficiency of machines with rapid motion, such as weaving machines, adding machines and typewriters, will be materially stepped up." He referred also to the application of magnesium to household appliances, office equipment, sporting goods and various other products.

Declaring that much good technical data have been developed, E. H. Perkins, president, Brooks & Perkins, Detroit, was confident that it could be applied effectively to peacetime requirements. However, he suggested that producers of magnesium stampings and castings should first seek out business where their products are really applicable. "Don't look for the toughest places," he said "but for the present take the easiest line of resistance. Stop trying to get some new use which will blanket the market. Pick out places where magnesium is best."

Price Is Main Factor

He regarded the matter of prices as highly important to magnesium sellers. During the war, he said, the emphasis was on production regardless of cost; today in the highly competitive commercial field the emphasis is on prices.

Prices also were stressed by D. W. Moll, vice president, Hills-McCanna Co., Chicago, in his report as chairman of the casting division. He said that while competition among magnesium producers was generally good competition, various methods for calculating foundry costs were still being used and that still more attention could be given to the subject, from the standpoint not only of competition among the magnesium casting producers themselves but among manufacturers of other types of castings.

Mr. Moll also pointed to the desirability of closer appraisal of the civilian field for magnesium castings. "It is high time," he asserted "that we get out of the laboratory and production departments and find out what we can actually do with our products."

Reporting on the work of the standards committee, A. W. Winston, Dow Chemical Co., New York, said that it had been suggested to the Casting Division that a booklet of specifications be prepared setting forth essential information which should be included on part drawings or orders and giving instructions as to how this should be done. On the matter of nomenclature the committee suggested that the association adopt the current American Society for Testing Materials system as it applied to magnesium alloys. While there are some deficiencies present in the ASTM system, Mr. Winston said, it was agreed that the only reasonable course is for the association to work with ASTM toward the development of a single system of maximum simplicity and utility.

T. W. Atkins, executive vice president of the association, said there was a need for engineering data that could be sent to all companies that are potential users of magnesium and hoped that it would be available in the near future—something prepared by the association's best technicians, with suggestions from other members and which would be the forerunner of a more comprehensive book, "A Magnesium Bible." He discussed various other methods of promotional work, including a motion picture, which could be produced to tell the magnesium story to the public.

E. W. CHRISTIANSEN
President
Magnesium Association

Because of design changes requiring balance at high, but varying speeds, the textile machinery industry is becoming potentially a heavier user of magnesium. W. G. Harvey, American Magnesium Corp., Cleveland, estimates consumption may reach 6,000,000 lb annually in the not distant future, the lighter metal in die and sand castings, extruded shapes and other forms replacing wood parts in most cases. Magnesium stands up under high compression which severely taxes wood parts.

Keynoted throughout the meeting was the need of the industry to open additional civilian markets for magnesium. In this connection L. W. Morrell, assistant sales manager, Revere Copper & Brass Inc., Chicago, outlined progress of the merchandising educational program with joint exhibits by three producers at 15 meetings attended by approximately 2000 persons, some of whom showed interest in the use of magnesium for such items as wheelbarrows, portable tools, pattern plates and core boxes in foundries, motor truck bodies with stressed parts of extruded shapes, and tire repair tools. For some of these, magnesium is beyond experimental stages.

Problems of the magnesium industry in transition to peacetime civilian production are frankly acknowledged; it may be 20 years ahead of itself in increasing output from about 6,000,000 lb in 1939 to 600,000,000 lb a year for war. This was stressed following the pledge of the Surplus Property Board of full cooperation in placing government-owned magnesium plants into civilian production at the earliest possible moment. The opinion was expressed that a sufficient civilian market must be demonstrated to justify expenditures demanded for plants utilizing higher production methods. Also, the government stockpile of magnesium, estimated at nearly 100,000,000 lb, is equivalent to about 20-months' supply.

Peace Reduces Demand

Anthony Cristello, foundry manager, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J., in his report for the technical committee, pointed out that various government agencies have estimated that peacetime demand for magnesium will be about one-eighth of peak wartime production. "Either we accept this estimate and reduce our business accordingly or we get to work and develop new uses and requirements for magnesium," he said.

The industry has already started to do this, but he said that various questions are being put up by people in industries who know little or nothing about magnesium and that they must be fully answered. He cited the question of fire hazard in machining and the use of magnesium. "We know this question is easily taken care of" he asserted, "because we are familiar with the metal, but we must find a common technical ground on which to present our case for the new uses of the metal."

Questions arise as to the relative corrosion of the alloy and the surface treatment required. However, when considered in conjunction with the benefits of the magnesium alloy, the corrosive properties of magnesium do not present much of a problem, he thought. "We already have several good practical surface treatments for magnesium castings", he declared, "and it should be our job to anticipate any further needs for new and different surface treatments in order that magnesium castings can serve industry in any capacity required."

Mr. Cristello emphasized that it was the job of magnesium sellers to fully

(*Concluded on page* 146)

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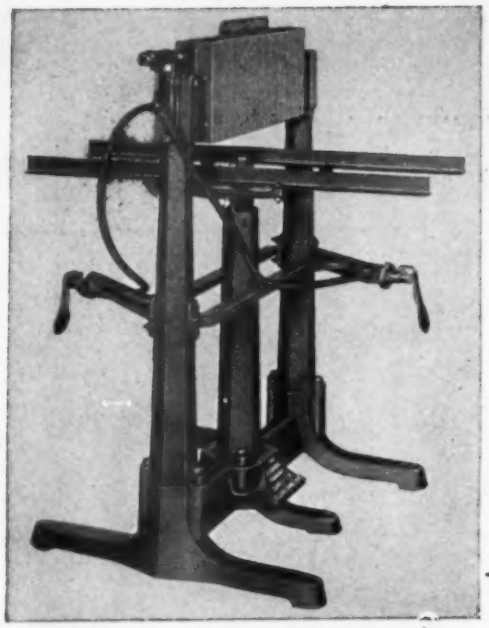
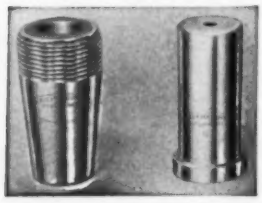


FEDERALS



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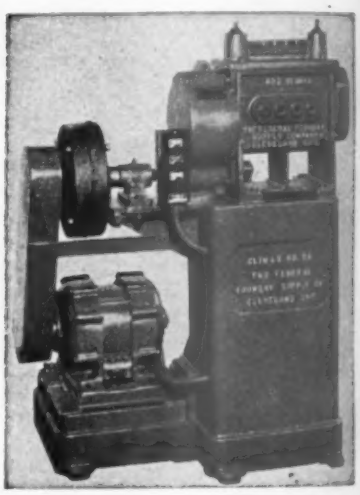

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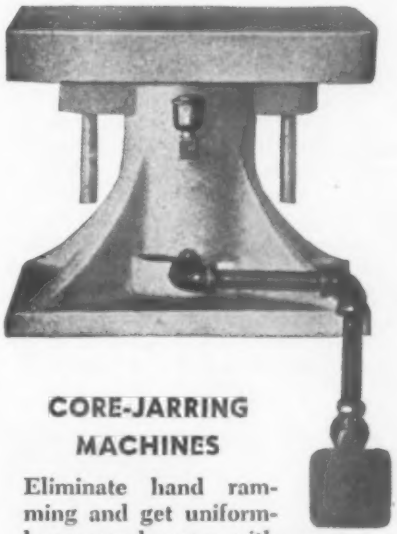

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(*Concluded from page* 144)

acquaint other industries with the features of magnesium—to point out "that magnesium combines strength with lightness, that it reduces noise and wear on adjacent parts; that it machines 25 per cent faster than any other alloy; that thicker sections are available thereby increasing strength without materially adding to the weight of the casting; that it has high resilience properties, good damping capacity for vibrations and dimensional stability."

Magnesium castings he said, incur less damage from impact than does a comparable steel part; are relatively free from distortion and from permanent growth or contraction. He declared also that magnesium is non-toxic and non-magnetic and that in machining magnesium castings there is no tear or drag effect.

All these points, he believed, should be translated into terms which will be understood by the design and industrial engineers of magnesium's potential markets.

In the annual election of officers and directors, E. S. Christiansen, Magnesium Co. of America Inc., Chicago, was re-elected president. Other officers chosen include: Vice president, Anthony Cristello, Eclipse-Pioneer Division, Bendix Aviation Corp., Teterboro, N. J.; treasurer, Clayton E. Larson, White Metal Rolling & Stamping Corp., Brooklyn, N. Y.

Directors elected, in addition to Messrs. Christiansen, Cristello and Larson, are: J. D. Barrington, Dominion Magnesium Ltd., Toronto; Irving T. Bennett, Revere Copper & Brass Inc., New York; Arthur Bidwell, Superior Bearing Bronze Co., Brooklyn, N. Y.; C. A. Brantingham, Ebaloy Foundries Inc., Rockford, Ill.; Wiser Brown, American Magnesium Corp., Cleveland; Leo B. Grant, Dow Chemical Co., Midland, Mich.; D. W. Moll, Hills-McCanna Co., Chicago; T. I. Mosley, Dalmo Victor Inc., San Carlos, Calif.; W. H. Osborne, Acme Aluminum Foundry Co., Chicago; E. H. Perkins, Brooks & Perkins, Detroit; D. A. Rhoades, Permanente Metals Corp., Oakland, Calif.; H. E. Shepard, Rupert Die Casting Co., Kansas City, Mo.; V. D. Sweeney, National Smelting Co., Cleveland; R. D. Taylor, Federated Metals Division, American Smelting & Refining Co., New York; F. E. Wellman, Wellman Bronze & Aluminum Co., Cleveland.

Metal Show Planned For Cleveland

Plans have been completed for holding the 27th National Metal Exposition in Cleveland, Feb. 4 through Feb. 8, the American Society for Metals has announced. The exposition again will be held in conjunction with the National Metal Congress, in which the ASM and the following will participate: American Welding Society, the Iron and Steel and Institute of Metals divisions of the American Institute of Mining and Metallurgical Engineers, and the American Industrial Radium and X-Ray Society.

A highlight of the recent Magnesium Association convention in New York was the announcement of publication of the first comprehensive book on the magnesium industry in America, *Introduction to Magnesium and Its Alloys*, by John Alico. Shown receiving autographed copies, left to right, are: E. S. Christiansen, president of the association; Lee B. Grant, sales manager, magnesium division, Dow Chemical Co.; John Alico, and Arthur W. Winston, Dow Chemical Co., who wrote the foreword to the book

FUTURE OF LIGHT ALLOY FOUNDRIES

(*Continued from page* 95)

very high outputs despite the severe shortage of skilled foundry workers. For this purpose I have chosen as my example the foundries of the Rolls Royce Co. at Glasgow. Fig. 1 is a section of the sand foundry showing the layout of the molding machines and conveyors, while Fig. 3 shows the molding and core assembly of the top half of the Merlin crankcase in this foundry—a fine example of the proper use of labor-saving machinery and equipment. Fig. 8 is a close-up of the molding machine pattern and mold for this casting and clearly illustrates what can be done with first-class equipment.

Fig. 4 is a view of a production line in the permanent mold foundry at Glasgow—the first fully mechanized gravity die casting plant in Great Britain, while Fig. 2 shows the inspection line there and also illustrates the fact that even in a foundry modern conceptions of building, equipment, and layout can provide pleasant and clean working conditions.

Increase Core Production

Fig. 7 is included to illustrate what can be achieved by the use of modern molding machinery combined with proper design and fine pattern equipment. It shows a girl making large intricate and complicated cores at the rate of 30 per shift which contrasts sharply with the 6 cores per shift produced by skilled coremakers by the conventional hand methods. Finally, Fig. 5 shows a new departure in foundry work—the jig and spot location of castings which entirely eliminates the "marking out" of castings in the machine shop and enables them to be placed directly in their machining jigs.

It would, of course, be easy to go on showing a large number of illustrations of the many other fine foundry layouts which have been built in recent years, but space does not permit doing justice to their achievements.

There is little need to point out that the question of price takes a paramount place in discussion of the extent and nature of future markets for light alloy castings. I have constantly drawn attention to the problem created by the existence of a very large light alloy fabricating industry in this country and the moderate size of our domestic resources for production of aluminium. I have drawn attention, at every opportunity which has presented itself, to the danger of a policy of tariff barriers against overseas suppliers of cheap light metal as a threat to the existence of this large and vital industry.

As you know, the price of primary aluminium has now been reduced from £110 to £85 per ton and I believe that still further reductions can be made if

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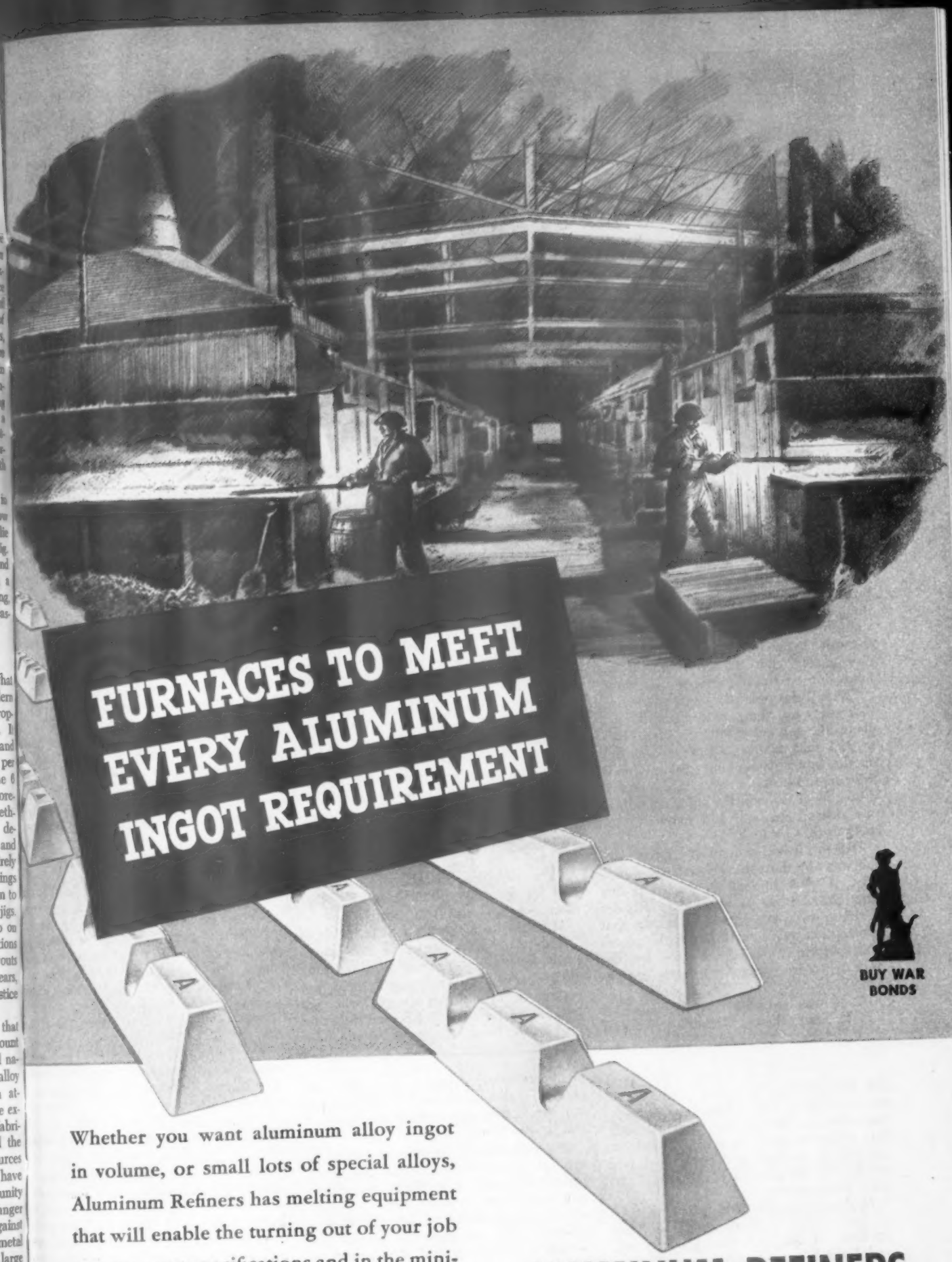

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MAN-TO-MAN *on the Molder's Bench*

By RALPH L. LEE

SHORTLY after Mother and I were married I bought her a hand-cranked cake mixer that clamped onto the kitchen table. I remember I could hardly wait to get home to show it to her, and I was a little disappointed when she didn't enthuse much over it.

About a year later, while rummaging around in a neglected corner of the kitchen cupboard, I found the cake mixer which reminded me I had never seen Mother use it, even once. I did not lose my temper, but did point out the danger of getting into a rut by refusing to take advantage of improved methods and devices.

Mother didn't lose *her* temper either but she did tell me in no uncertain terms that cooking happened to be her responsibility and that she did not want the cake mixer. To my "Why, in Heaven's name?" she answered that it was more darned trouble than it was worth.

"First," she went on, "I have to hook that clamping thing onto the pan, next clamp the pan onto the table, then I have to stick that mixing gadget into the hole on the thingamabob that goes on top of the pan and fasten it there. On top of all this, I have to hook the thingamabob on one side of the pan and screw it tight to the other side.

"All this is bad enough, but I don't like the way the darn thing mixes cakes anyway. I want to feel the batter mixing through a spoon in my hand. Besides I refuse to waste my time taking that contraption apart, washing all the pieces and putting them away—and by the way, when are you going to carry out the ashes?"

As I was carrying out the ashes, I had to acknowledge Mother's point and realize it probably was a good thing to be on guard for intriguing gadgets, systems and procedures which are destined to turn out to be more trouble than they are worth.

All this came back to me a short time ago while going through a large foundry run by a man who must have bought his wife a cake mixer. I don't believe I saw in that great big place one single Goldberg invention—one amazing revolutionary process, system or device. But I do know that in spite of the lack of high falutin' gadgets, they had distinguished themselves during the war in a brand-new field—one entirely foreign to them.

What gave me a bang was that most of the methods and devices they pointed out to me as being responsible for their splendid accomplishments would have worked just as well in the smallest foundry.

While it would be hard to pick out any one single reason for this foundry's success, the nearest thing to it I believe would be that there wasn't a job I saw in the place that didn't require more than the usual amount of skill. It looked as though they didn't engineer all the fun out of their employees' work. In other words, they left some room for the folks to make or avoid mistakes. As I was leaving, the boss told me they had few geniuses in the place but that most everyone used his head.

It could be we, with a little touch of "gadgetitis," have expected too much from automatic systems, layouts, time studies, tests and safeguards, and not enough from ordinary people who are invited to use their heads and skills on jobs with room for work satisfaction.

(*Continued from page* 146)

the import from low cost producers is not interfered with. The time is ripe, therefore, to discuss the effects which this reduction and the improvements in production methods and equipment will produce in the price of engineering light alloy components.

In discussing this matter I immediately find myself in a somewhat difficult position. I am very strongly opposed, and I think most foundrymen will support me, to the system which has grown up in the past of quoting castings in terms of a price per pound. This system is particularly hurtful to light alloys in comparison with the heavy metals. Few engineers would expect to buy fully machined engine parts on a weight basis, nor would they expect their machines to sell by the pound.

My difficulty is to present prices in general terms without using the price per pound basis. It might be considered unethical of me to make direct comparisons between similar castings of different materials and my argument would lose weight if I were to deal with hypothetical castings. I have resolved, therefore, under the protection of the preceding remarks, to make my comparisons on the weight basis, emphasizing that they are so made only to facilitate generalized comparisons and that they should not be taken as signifying any concession the system as applied to specific casti

In discussing this question of price must first draw attention to the fact t during the past six years the normal p dominance of price has had to give w to that of expediency, and it is w known that all costs have risen we above prewar levels.

One of the best examples is one of th most important light alloy castings pro duced during the war, the crankcase fo the Rolls Royce Merlin engine.

Most of these crankcases have bee produced in a foundry built and equipped for full-scale mass production during the war. It is produced very largely by girls. Production has been a the rate of 500 of these complicated castings per week. When aluminium was at a controlled price of £110 per ton, or 11.8 pence per pound, this casting was produced for 2/5d (approximately 48 cents. Ed.) per pound, and I would emphasize that it is a complicated casting made in a high duty, heat treated alloy—Hiduminium R.R.50, to be precise. With the present ruling price of £85 per ton, or 9.1 pence per pound for aluminium, the casting is being made for below 2/3d. per pound.

Secondary Aluminum Cuts Cost

Those figures refer to castings made from primary materials, but we must also take into account another important development during the war, the great advances made in the recovery of high quality secondary alloys from scrap. This has a very important bearing on this problem, for we are presented here with another important reduction in costs. Secondary aluminium of high quality can be made to very close composition tolerances for less than £45 per ton, or 4.8 pence per pound. This means that such a complicated sand casting could be made for less than 1/7d. per pound.

If we go a step further we come to the possibility of making a rather less complicated casting by the gravity die, or permanent mold, casting process. An example of one of the most important of these die castings is the bottom half crankcase of the Merlin engine. Fig. 6 shows the die for this casting which is shown in Fig. 9 as it comes out of the die.

Everyone will agree that this is a remarkable achievement, especially when it is borne in mind that this casting is produced to the exacting requirements of aero-engine practice with all the searching tests that implies, at a selling price of less than a shilling a pound.

This means, in effect, that a similar casting of equal volume in a heavy metal, such as cast iron, would have to sell for below 4 pence (7 cents. Ed.) per pound to equal the price of the light alloy casting, even if we omit from our considerations the further savings—and these are quite considerable—which result from the greater ease of machining the light alloy casting, its lower handling and transport costs and the premium due for

(*Continued on page* 151)

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(*Continued from page* 148)

its great saving in weight as a machine component. It follows that for large outputs of light alloy castings where the standards of quality are less exacting than those in force for aircraft components, still lower prices will obtain, and I think that under these circumstances we can confidently look forward to a market for light alloy castings far greater and very much more varied than anything we knew before the war.

It should be pointed out that the foregoing remarks apply only in the case of castings made on a continuous production basis in quantities sufficient to permit the use of all the labor saving devices which have become so highly developed during the war. The volume of orders must permit use of the very best patterns and die equipment and fullest utilization of mechanized production and material handling methods.

Such foundries as I have described are an essential part of a modern industrial economy but they are by no means the whole of the industry. There must always be the smaller jobbing and short run production foundries to take up the thousand and one castings required in quantities insufficient to justify heavy investment in specialized equipment. Our civilization depends on so many items, most of them of trivial importance individually, that no amount of planning can provide for all our requirements for each item to be produced to a long term plan.

Price Important Factor

A great number of designs call for castings in which the matter of strength is of very little importance. In practically all of these the most important object is a low price for the finished goods and a pleasing appearance having sales appeal. In most cases lightness is also an advantage.

In this field I see great possibilities for large and medium scale production of pressure and gravity die casting of light alloy. Especially in this field do I visualize important applications for magnesium alloys, although I believe that the field will still be dominated by aluminium, including the secondary aluminium alloys.

Finally, I believe that there is a growing appreciation, resulting from modern developments in casting and quality control, of the economies offered by castings compared with fabricated assemblies. These will be used to an increasing extent to replace fabricated components when the particular machine or structure has been fully developed and has reached full production. Engineers have already shown their confidence in castings for highly stressed components in aircraft and they are becoming increasingly appreciative of the advantages which the flexibility of the casting process offers in design and of the freedom from "stress raisers" which the jointless cast component offers.

Among the most striking features of light alloy development in this war have been the way in which alloys, well established before the war, have been able to meet the increasing demands placed upon them, the pressing into service of alloys which were in the development stage at the outbreak of war, and the up-grading of medium strength alloys, particularly those made from secondary materials, to fulfill applications for which they were considered unsuitable before the war.

One alloy developed as long ago as 1927 for castings for a particularly highly stressed aero-engine, has continued in service to the present day. It has been modified from time to time, of course, but it has been found capable of fulfilling the requirements of both the engineers, as regards its performance in high output engines, and of the foundry production engineers and metallurgists, in its suitability for the production of sand, die and pressure die cast parts in high quantity production. It is a tribute to the inventors of this alloy and to those entrusted with its subsequent development that when manufacture of the particular engine to which I refer was undertaken in America during the war attempts to replace this alloy by one of more modern development were unsuccessful, and this alloy has since been used exclusively over there for this job.

The metallurgists have done a good job in developing new high strength alloys, and very high mechanical strength and ductility have been achieved. However, these advances have generally brought with them complications in the matter of purity, rather more difficult

(*Continued on page* 154)

High Manganese Cast Iron Has
RESISTANCE TO ABRASION

EXPERIENCE over a long period of time indicated to the plant foundry of the New Jersey Zinc Co. that relatively high manganese cast irons had properties useful in many plant operations of that organization. One limitation of that type of iron was its inferior castability. Another was the brittleness of the castings, but it was known that silicon additions counteracted the latter.

While the research laboratories of the New Jersey Zinc Co. are known for work in zinc alloys and compounds, the problem involved was one in an entirely different field of metallurgy. Consequently, the specialized experience and facilities of Battelle Memorial Institute were retained in the attempt to develop a castable high strength manganese cast iron alloy, using as the source of manganese the spiegeleisen produced by the former organization.

As a result of the work done at Battelle and the production and service testing of a variety of castings by the company, it was found that castings made with an optimum composition of about 10 per cent Mn, 3 per cent Si, 3 per cent C, remainder Fe, had wear resisting properties which compared favorably with the low alloy irons.

Since spiegeleisen provides a convenient source of both manganese and silicon as well as alloying easily with scrap iron in a cupola, this material was used in the research and service testing work. A typical cupola charge and sequence of operations is as follows:

300 lb spiegeleisen (19-21 per cent Mn, 2.5 per cent Si).
100 lb silvery pig iron (8 per cent Si).
100 lb steel rails.
50 lb blast furnace coke.
15 lb limestone.
670 lb blast furnace coke to provide 25-in. bed above the tuyeres.

Coke bed was lighted through the tap hole. After about 2 hr the first coke bed had burned through to a cherry red. Four hundred pounds of coke then was added to bring the coke bed up to 40-in. above the tuyeres and the blast was turned on for about 5 minutes. This was followed by a further small coke addition and 20 lb of limestone. Obviously, the number of charges depended upon the casting work scheduled. The top charge was covered with coke and the blast turned on. Within a few minutes the first ladle was tapped and the silicon was brought up to the required 3 per cent through the addition of 90 per cent ferrosilicon to the ladle.

It soon was found that for casting, the ladle temperature must not exceed 2500 F. Inasmuch as the alloy remains castable down to about 2300 F, this allows ample pouring time. The best molding practice for this alloy is to about double the normal size of the sprue hole and risers, while the runner from the sprue hole is made short as possible.

The alloy was tested in several high temperature applications and in numerous applications requiring a high order of abrasion resistance. It was soon determined that the castings became brittle when used in the range of 700 to 1450 F, and hence in cyclic heating, when the temperature passes through this embrittlement range, the casting life was short if subjected to shock loading. For continuous operation under 700 F or over 1450 F, the castings remained ductile.

The predominant characteristic of the alloy is its resistance to abrasion, a problem frequently encountered in many industrial plants. In the plants of the New Jersey Zinc Co. service testing of the alloy consists essentially in the production of such parts as material and residue handling equipment, grinding rolls, floor plates, etc. As a result of these tests the high manganese cast iron alloy has been found satisfactory for all parts where severe abrasion is encountered.

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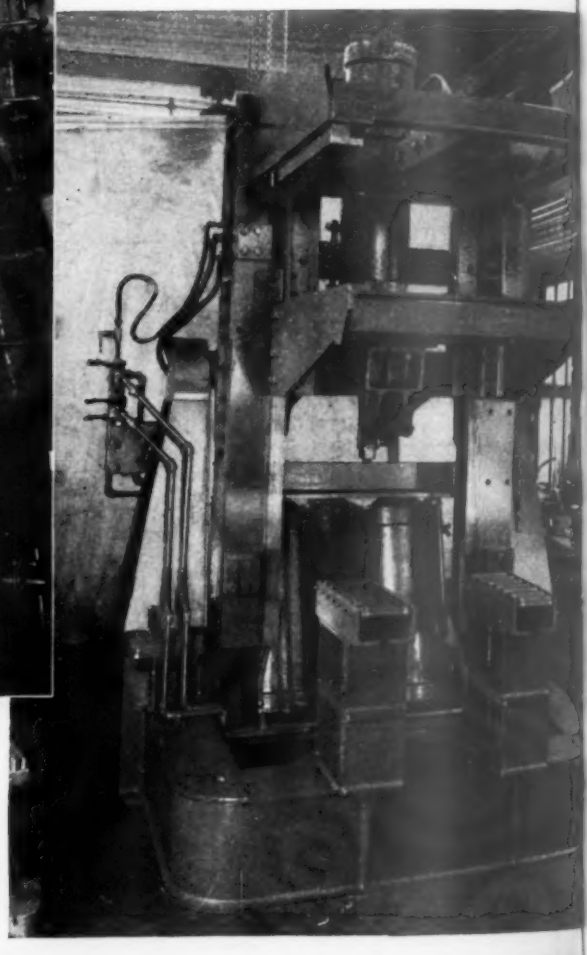
INTERNATIONAL Type AN Machine is especially suited for Short Run work, where a wide diversity of sizes of Core Boxes and Flasks is encountered.

Type AN is an Air Clamp, Air Turnover, Air Draw Machine, built in sizes to handle 30" wide x 16" draw; 40" wide x 20" draw; and 50" wide x 30" draw.

The Type AN illustrated has a gross weight of 28,500 lbs. and can handle 50" x 30" draw.



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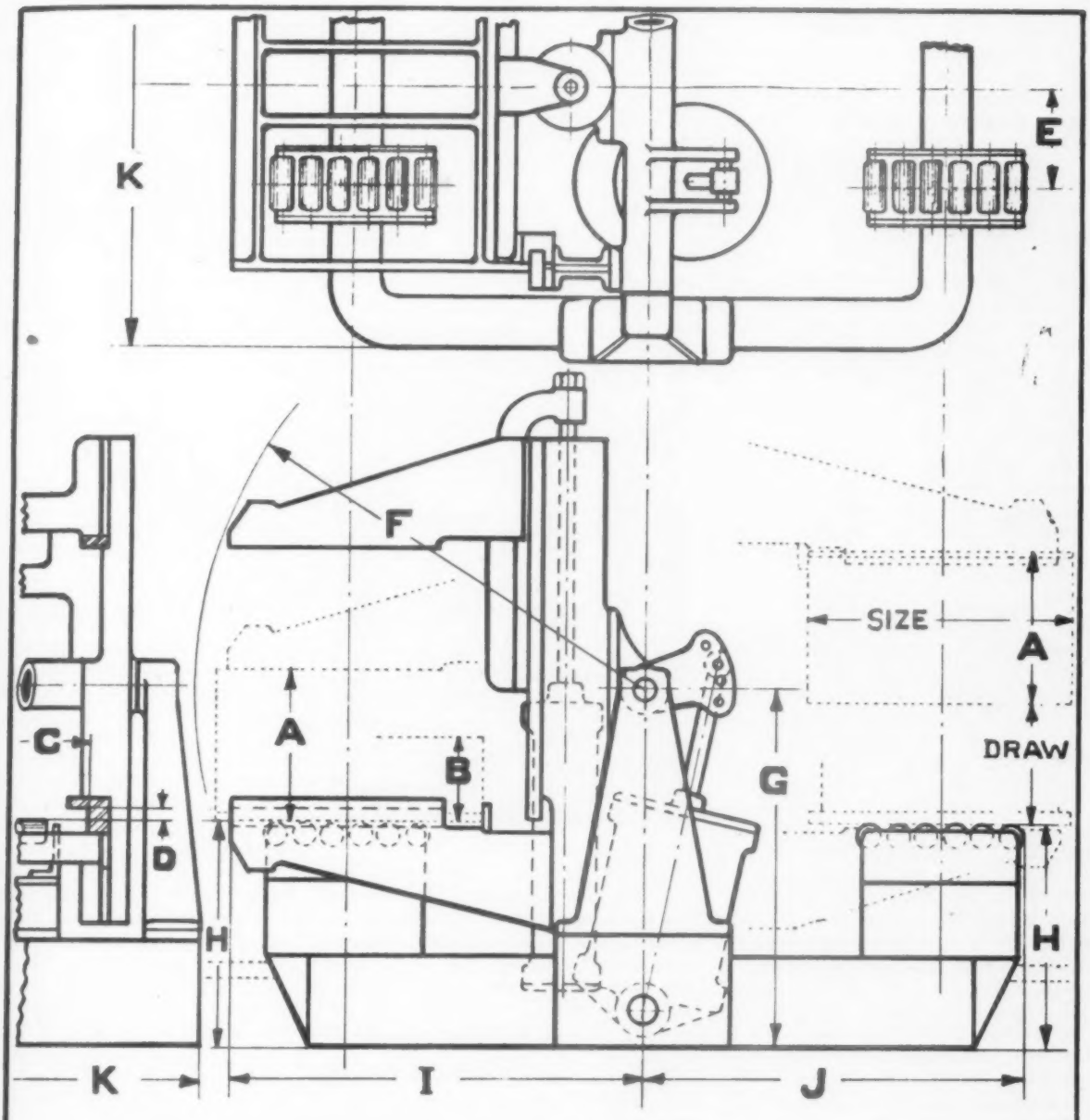
U. S. WAR SAVINGS BONDS

INTERNATIONAL MOLDING MACHINE COMPANY 608

MOLDING MACHINES



TYPE AN MACHINE

SIZE	DRAW	A	B	C	D	E	F	G	H	I	J	K
30"	16"	24	11"	42	3/4	11	52	45	25	46½	42½	62
40"	20"	31"	15½	40½	1 3/8	11½	60	66	40½	61	56	81
50"	30"	41½	21½	46½	1½	13¾	90	84½	48	75	68	96

INTERNATIONAL
MOLDING MACHINE CO.
CHICAGO, ILL.
12-28-44. W.L.J.

M-236

(*Continued from page* 151)

foundry characteristics, or more elaborate heat treatment processes. Consequently, use of these materials has been limited, as it should be of course, to those applications where their mechanical properties can be used to give a very marked advantage.

The medium strength and so called "secondary" alloys have played an important part in aircraft construction during the war. Their use was made necessary in the early days by the shortage of primary aluminium, but they were so well founded and the secondary aluminium industry has developed such fine methods of refining and control that these alloys have stayed on after the original reason for their use had passed away, overwhelmed by a veritable flood of primary aluminium from Canada. I have no doubt that they will continue in use for many years after the war, for it has been proved that with modern methods of refining and analysis the secondary alloys are of very high quality and suitable for all but the most exacting requirements.

Future uses of "secondary" alloys will depend on a number of factors of which the principal ones will be the difference between the prices of "primary" and "secondary" alloys and the supplies of scrap which will be available.

Sees Great Future Field

It does not require much imagination to see the lines of development which lie ahead in the field of aluminium casting alloys. In the first place, the greatest demand will be for alloys which will enable cheap reliable castings to be made. This will mean that alloys will be simple in constitution, have good casting properties especially in respect of gravity and pressure die casting, will not require elaborate and expensive heat treatments to develop mechanical properties adequate for the majority of purpose to which they will be applied, good resistance to corrosion and ability to take surface finishes, particularly colored anodic coatings, which will suit them to a wide variety of surroundings.

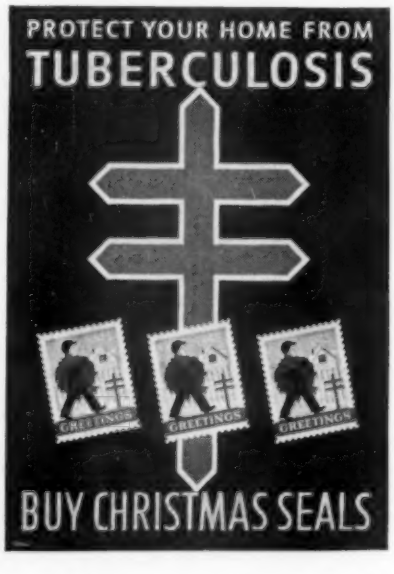
On both sides of this core we shall develop alloys for special purposes. We shall, no doubt, be asked for, and shall achieve, increasingly high mechanical properties in heat treated materials. We shall continue the work of improving the properties of alloys at elevated temperatures in order to adapt them to the increased demands of all kinds of engines, including those of the internal combustion turbine which is now developing so rapidly.

At the other end of the scale we shall see the development of low and medium strength alloys particularly for pressure die casting purposes for a wide variety of applications where low cost will be the overriding consideration and durability will be far more important than mechanical strength.

All of this adds up to the simple conclusion that so far as high strength alloys are concerned development will continue in the pattern of the past years, while those research and development organizations which, hitherto, have devoted most of their efforts to such alloys, will pay increasing attention to the lower strength materials.

It is in the field of magnesium casting alloys that I anticipate the most important developments. It is only within the past two years that we have come to understand the corrosion behavior of magnesium. It is only quite recently that we were congratulating ourselves on overcoming the inclusion of electrolyte and flux which gave rise to the legend that magnesium castings were liable to disappear almost overnight.

The important work of Dr. Hanawalt on the effect of very small impurities on the corrosion resistance of magnesium has coincided with, and perhaps was partly suggested by, the new processes



for producing magnesium which have come into operation since the outbreak of war. Some of these processes, in particular the thermal reduction processes, yield a product remarkably low in those impurities which have now been found to be so severely detrimental to the corrosion resistance of magnesium and its alloys.

With this new high purity magnesium now available in commercial quantities at commercial prices, we are presented with great opportunities for the use of magnesium castings in applications where, hitherto, they would have suffered severe corrosion. At the same time we have evolved protective processes which offer greatly improved resistance to corrosion.

The present control price of magnesium ingot is 1/6d. per pound, yet the high purity metal from Canada could be sold in this country, at the present time, for ½d. per pound and I am told it is hoped to be able soon to sell it at an even lower price.

Another property of magnesium alloys which will receive attention of the research metallurgists is the relatively low yield point. Perhaps too much emphasis has been placed on the ultimate strength characteristics of magnesium alloys which, considering their low specific gravity, compare very favorably with other alloys, but the wide difference between their ultimate strength and yield point is a considerable disadvantage in practice. Properties of magnesium alloys at moderately elevated temperatures will also need to be improved if they are to be utilized for engine castings.

As much as that of any other industry the future of the light alloy foundry industry is dependent on research. We require a great deal of research on new alloys and new castings processes and machines, new ways of making molds and dies. We must inquire into the problems of resources and markets and we must study many aspects of human relations and welfare.

In scientific research and development I would stress the importance of research by individual firms as well as of co-operative research by associations. In the future no firm, least of all one in a highly technical industry like the founding of light alloys, will be able to carry on without conducting its own research into its own peculiar problems. No amount of collective research will make up the leeway between the firm which applies research methods to its production and that which depends on information handed out to all in the industry.

Valuable To Small Business

I have been very impressed by the growth and the quality of work of those research foundations in the United States which provide facilities and equipment for the carrying out of research on behalf of individual companies. This sort of institution is particularly valuable to small businesses, such as those which form an important part of the light alloy foundry industry in this country, and are also very useful to the larger businesses which maintain their own research departments. I think such institutions would be a great asset to our industrial structure in these days when to do research properly involves the provision of equipment often beyond the means of the small business to maintain.

It is also of vital interest to the industry to ensure an adequate flow of young people into the foundry to maintain that reservoir of properly trained molders, coremakers, and patternmakers upon whose skill it is based. I am very glad to note in this connection the energetic steps which are being taken by this institute to draw attention to the attractions of a career in the foundry.

At the same time I think that one of the most important tasks in the future will be to keep up with scientific and technical developments as they can be applied to the foundry. A great deal of original research is being undertaken here in our universities and research institutions and I hope that this will continue on an increasing scale as the promised additional support becomes available.

We shall lose the benefit of the great achievements of our fundamental scien-

(*Concluded on page* 156)

STAND A SHOCK?

CARBON AND GRAPHITE can be heated to incandescence and plunged into cold water without the slightest harmful effect!

This extraordinary resistance to thermal shock is the basis of many applications of "National" carbon and graphite and of "Karbate" products* in the metals, chemical, electronics, textile and other industries.

But these materials also have other equally important qualities. So you must think of them in terms of *all* their properties . . . in combinations possessed by no other materials.

It will help you to understand why carbon run-out troughs give up to six months' service in steel mills . . . why graphite anodes made the mercury-arc rectifier practical . . . why graphite molds for ferrous and nonferrous metals don't crack, spall or stick . . . why graphite bubble caps retain their original dimensions throughout the heat cycle of any chemical tower . . . and why "Karbate" heat exchangers resist practically all acids, alkalies and solvents.

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(*Concluded from page* 154)

tists, however, unless we in industry can so organize ourselves as to apply the great advances they are making in scientific knowledge, to the improvement of our materials and processes and apply them rapidly without the great time lag between discovery and application with which we have been satisfied in the past. We must not lose the technique of the rapid exploitation of new discoveries which we have evolved under the urgency of war.

Unless we can attract a sufficient number of properly trained scientists into the foundry industry to interpret and apply the latest scientific discoveries, and unless we are prepared to give them the confidence and authority necessary to implement their projected improvements then the products of our own scientific research will go to other countries—the United States for instance—where the scale of technological education and of the employment of scientists in industry is at present much higher than it is here.

I believe that the universities also have an obligation to condition their students for industrial life. At present the tendency is for more brilliant science graduates to stay at, or, after a brief experience of industry to return to, the academic research institutions. To fulfill all our requirements for industrial research without depriving the academic laboratories we shall require larger numbers of properly trained scientists and it is essential that the universities and the industry should co-operate to devise the means of ensuring that the young scientists destined for an industrial career shall fit easily into industry.

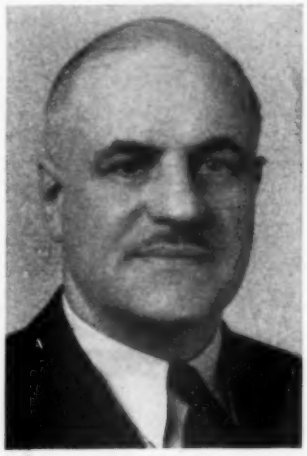
Scientists Should Be Rewarded

Industry will then have the obligation to see that the scientists and technicians are properly rewarded for the contributions, that their work is appreciated and their achievements acknowledged. There should be no barriers to prevent them from rising, if they show the ability to the highest administrative posts. At the same time, they should not be pandered to at the expense of other branches of foundrymen and on no account must we give way to the claims of the few very articulate scientists who claim that industry should be run by and for the benefit of scientists because they alone can control it in the proper way.

The whole of British industry has a heavy responsibility in the critical years which lie ahead of our country. Upon its ability to maintain itself at the highest pitch of efficiency will depend our place in international trade and our ability to import the food and raw materials we require, the fulfillment of our plans for a better Britain and the way of life of our people. In this tremendous task the light alloy foundry has an important part to play. In my opinion it is in fine condition to undertake its responsibilities. Great new efficient foundries are available, teams of managers, technicians and craftsmen of proven ability are eagerly awaiting the signal to start on the new tasks which lie ahead. Light alloy castings stand in high esteem among engineers, who, provided their confidence is maintained, will find increasing uses for these castings.

Engineering Firm To Serve Foundries

Westover Engineers, a new organization formed to serve exclusively the foundry industry on cost controls, occupational and job evaluation and wage incentive problems, has been established by C. E. Westover, with headquarters at



C. E. WESTOVER

424 East Wells St., Milwaukee 2. With him will be associated his son, Jeff. Alan Westover.

C. E. Westover is well known in the foundry industry, having been associ-

JEFF A. WESTOVER

ated with it for the past 30 years, of which 18 years have been spent in installing and operating industrial management systems in foundries. He recently resigned from the staff of Grede Foundries Inc., Milwaukee, with whom he was affiliated the last two years. Previously, he was executive vice president and treasurer of the American Foundrymen's Association.

Jeff. Alan Westover resigned from Dyer Engineers Inc., Cleveland, after a association of five years, and prior that time had spent six years specializi in installing and operating wage incenti systems. An active member of AFA, h is a member of the Committee on Jo Evaluation and Time and Motion Study

Malleable Foundry Design

(*Concluded from page* 105)

natural gas supply, the propane gas is vaporized and pumped into the plant system.

Rigorous fire protection measures surround the propane installation, including explosion vents and a dike around the storage tanks. A separate small boiler supplies the steam required for the propane system.

Other structures on the property include an electrical substation and a gate house. The property is fully enclosed by fences and flood lighted at night as a protective measure.

Separate parking lots are provided for office and factory workers, and the site affords ample room for future expansion.

Old buildings remaining from the previous occupant of the site have been made water-tight and are now used for warehousing. During construction of the malleable iron plant they served as construction offices and for materials storage.

The general contractor was the Thorgersen & Erickson Co.

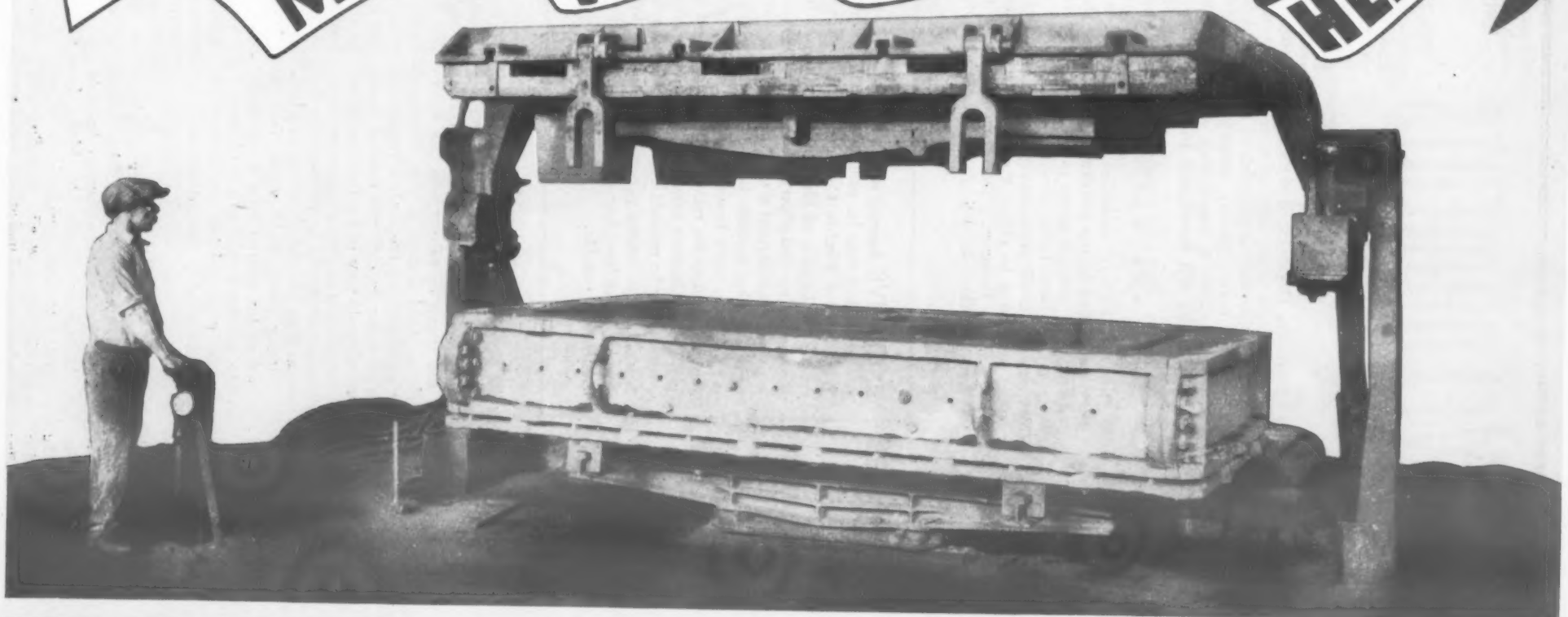
Output of Magnesium Bombs 120,000 Tons

Magnesium foundries shipped 237 million lb—almost 120,000 tons—of incendiary bomb body castings during the 42 months ended July, 1945, according to figures released for the first time by the Aluminum and Magnesium Division, WPB. It is estimated that this quantity of castings was sufficient to make almost 400,000 tons of finished fire bombs after the castings were loaded and equipped with nose, fuze, and tail components.

From a trickle early in 1942, output of the bomb castings increased steadily to a peak of more than 16 million lb in March, 1944, declining thereafter to less than 1½ million lb in November that year. However, the spurt in munitions production after the Battle of the Bulge in Europe pushed magnesium bomb production to over 5 million lb a month in the spring of 1945.

Dominion Oxygen Co. Ltd., a unit of Union Carbide & Carbon Corp., plans construction of an oxygen-producing plant and an acetylene-generating plant at Vancouver, B. C., as well as erection of an oxygen filling station at Winnipeg, Manitoba.

BETTER MOLDS FASTER & CHEAPER- write HERMAN



MOLDING HERMAN MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH, PA.

foundry DEVELOPMENTS

FROM time to time a question arises on the most desirable pouring temperature for certain nonferrous alloys. Since that will depend upon the thickness of section, intricacy of the casting, etc., it is impossible to give a definite temperature which will fit all cases. However, suitable pouring ranges are available which will provide a starting point, and these include the following:

Type Alloy	Range F
Leaded red and leaded semi-red brasses	1950-2250
Leaded yellow brasses	2050
Manganese bronzes	1850-1950
Tin and leaded-tin bronzes	1950-2250
High-lead tin bronzes	1850-2200
Leaded nickel brasses and bronzes	2050-2600
Silicon-copper brasses and bronzes	1900-2150
Aluminum bronzes	1950-2250
Aluminum-base	1250-1500
Magnesium-base	1400-1600

• • •

PROPOSED simplified practice recommendation for cast brass solder-joint fittings has been approved for promulgation according to the Division of Simplified Practice, National Bureau of Standards. Identified as R212-45, the recommendation sets up a stock list of fittings representing the best thought of the industry, its distributors and customers as to what constitutes desirable practice. Sketches illustrate the 37 types of fittings, various sizes of which are included in the list. Copies of the recommendation may be secured from Division of Simplified Practice, National Bureau of Standards, Washington 25, D. C.

• • •

NEW phosphor bronze shielded electrode for arc welding bronzes, brasses, copper, steel, cast and malleable iron is claimed to have many advantages. Operating on reverse (positive) polarity, direct current, the heavy specially designed coating is said to eliminate use of the long arc, and the metal is deposited by a spray action. The electrode can be used successfully in all positions—flat, vertical and overhead. The electrode is said to conform to AWS-ASTM specifications ECu-2A and to meet Navy requirements for phosphor or bronze electrodes.

• • •

INFORMATION from the Office of the Publication Board, Department of Commerce, describes what is claimed to be an excellent substitute for mica insulation between commutator segments in motors and generators. Development of the material, which is an impregnated glass fiber, occurred in Germany as the result of the shortage of mica usually employed. Woven glass fabric is impregnated with synthetic resin, and hot-pressed to desired thickness.

• • •

PRODUCTION of aluminum alloy sleeves and tubes by the centrifugal casting process by ordinary means usually results in the bore being covered with wrinkles and scruff necessitating considerable machining to obtain the desired clean surface. However, a recent development described in US Patent No. 2,383,442 eliminates that disadvantage by providing a clean bore except for an extremely narrow zone at the top section of the sleeve or tube where the scruff collects. Odd feature is the procedure for accomplishing the desired results — use of water to chill the internal bore, particularly in view of the fact that many of the troubles in casting aluminum-base alloys are attributed to moisture. In the method described the alloy is poured into a rotating metal mold which then is cooled on the exterior by a water spray. A few minutes thereafter a small amount of water is poured into the bore which drives the scruff to the top section.

• • •

NEW gas turbine laboratory to be built from gifts totalling half a million dollars received by the Massachusetts Institute of Technology, Cambridge, Mass., for graduate instruction and fundamental research in that new and promising field of engineering will undertake a broad program combining research and advanced technical education. One of the problems which will receive considerable attention is materials to resist high temperatures.

• • •

DISCUSSING shrinkage of nonferrous metals W. A. Baker in *Shrinkage and Gas Effects in the Casting of Nonferrous Metals and Alloys* (recently published by the British Nonferrous Metals Research Association, London) states, "Of all the variables in the casting process, the method of filling the mold is the most important one which may be conveniently varied to produce the desired conditions of solidification. It is impossible to specify a universally applicable method of running; each casting must be treated individually, but it may be taken as a golden rule that the method used should be such that the first poured metal is located in the parts of the casting remote from the feeder where it will soon become cold, and the last poured metal will remain hot in the feeder and the adjacent parts of the casting. Direct pouring at a controlled rate through bushes located above the feeders is strongly recommended; where drossing difficulties make this impractical, the middle-running, side-running or 'inversion' methods should be used to promote directional solidification towards the feeder. The bottom-running technique should be avoided wherever possible. In addition every effort must be made to eliminate variations in rate or total time of solidification at bosses, junctions of sections and changes of section, by the use of chills to promote a smooth temperature gradient."

• • •

APPLYING an aluminum coating to 2000-lb cast steel pots for melting magnesium-base alloys is said to result in increasing the life over 4 times. The procedure which is a proprietary process, is to abrasive-blast the pot and then spray on a thin coating of a nickel-chromium alloy. Following that the aluminum is sprayed on, and a special sealer is applied. No heat treatment is required since the first heating in the furnace will cause alloying of the coatings with the steel.

EXCESSIVE bearing wear and resultant bearing failure in industrial motors and generators may be caused by shaft currents according to D. B. Hoover, Westinghouse Electric Corp., East Pittsburgh, Pa. Current that is present crosses the bearing oil film and flows into the bearing shell. That action pits bearing surface and often the shaft. Rate of wear may be rapid or slow. Bearing wear is accelerated if the current is large and loading high. Simple method of determining possible bearing currents which may be direct or alternating, is to attach a short heavy cable to the bearing bracket or pedestal and touch the other end to the rotating shaft. Persistent sparks between shaft and cable end indicate bearing currents are possible. Both direct and alternating bearing currents may be reduced by shunting them out of the bearing by adding brush-holders to the bearing pedestal or bracket with brushes that ride on the shaft. Brushes must have low resistance and metal-graphite type with high copper content are suitable.

PROOF

OF THE INHERENT QUALITY IN CROWN HILL SEACOAL...

A seacoal can be no better than the coal from which it is made. The following analyses of Crown Hill coal made by the U. S. Bureau of Mines reveals why this seacoal is so popular. Note the high volatile content for quick venting; extremely low sulphur content eliminates hard spots; and the high fusion point of the little ash residue assures cleaner castings.

CROWN HILL COAL
(Moisture Free)

PROXIMATE ANALYSIS	
Volatile Matter (V.C.M.)	38.9%
Fixed Carbon	57.4%
Ash	3.7%
	100.0%

ULTIMATE ANALYSIS	
Hydrogen	5.4%
Carbon	82.0%
Nitrogen	1.6%
Oxygen	6.6%
Sulphur	.7%
Ash	3.7%
	100.0%

Fusion Point of Ash . . . 2,780°F.

FIGURES FROM
BUREAU OF MINES
DEPT. OF INTERIOR OF THE UNITED STATES

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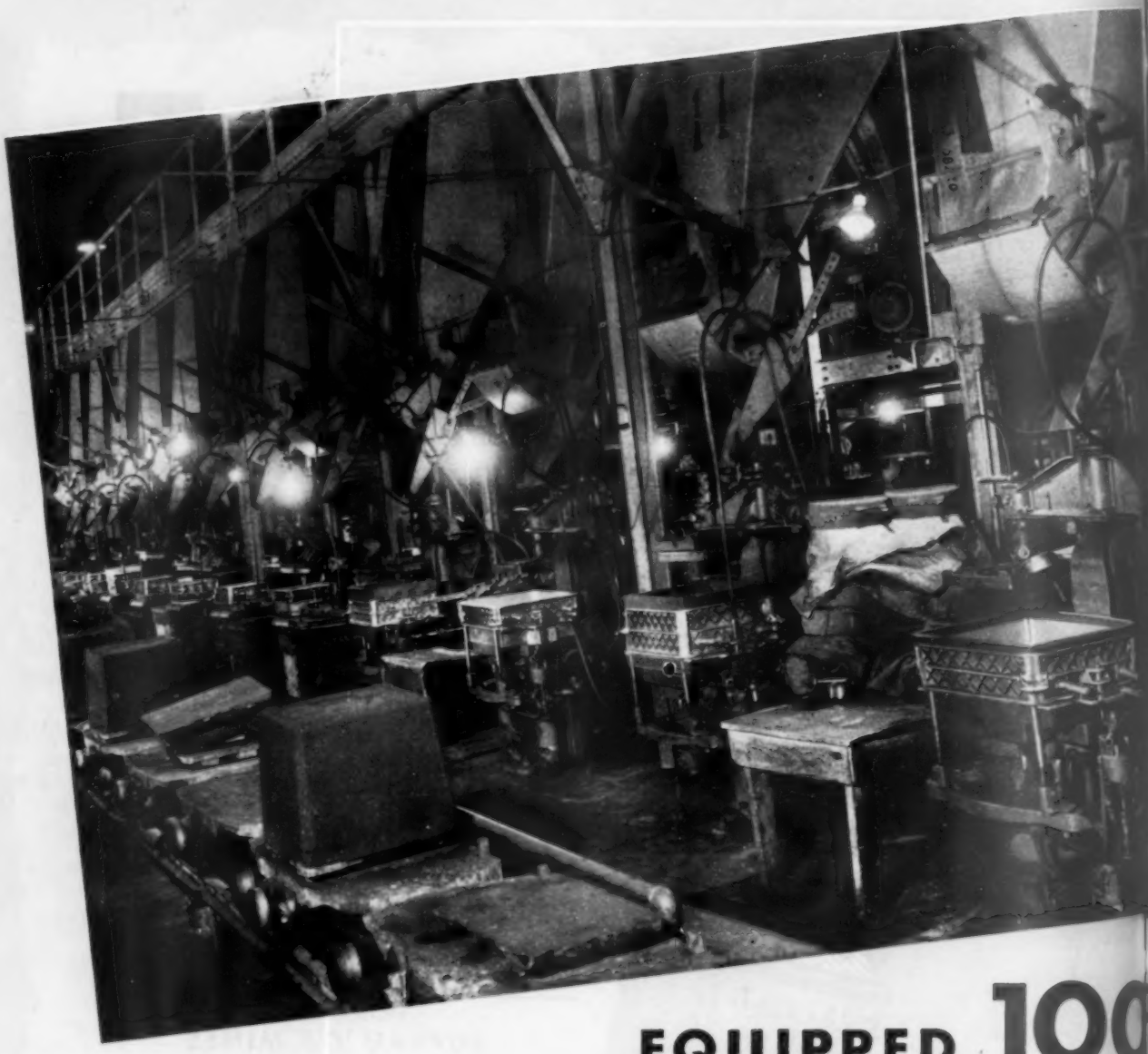
IN TWIN CITIES: The Foundry Supply Co., Inc., 2295 University Ave., St. Paul 4, Minn. IN SOUTHWEST: Beaumont Cement Sales Co., Houston & Beaumont, Texas, and Harvey, La.

YES, IT'S ANOTHER UP



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S F L A S K C O.

CLEVELAND 7, OHIO

Simplified Molding of LARGE PROPELLERS

By PAT DWYER
Engineering Editor
THE FOUNDRY

A RECENTLY developed method of molding large bronze propellers in the Philadelphia Navy Yard foundry is shown in the accompanying illustrations. The method was employed for several years for molding small wheels, in the navy yard foundry, and elsewhere, but it is claimed this is the first attempt to handle large propeller wheels, up to 20 ft in diameter, in this manner.

Under various names, false cope, odd side, follow or matchboard, the device probably is as old as the foundry industry and has been in use where large numbers of duplicate castings were required, particularly where the patterns presented highly irregular parting lines. With a follow board or match, the time-consuming job of building up an irregular parting line or joint surface between cope and drag is eliminated. Certainly very few castings made in the foundry present a more irregular parting line than a propeller wheel, large or small.

Various materials have been employed in the construction of match or follow boards. These include green and dry sand, clay, plaster, wood, metal, and several proprietary compounds. In the

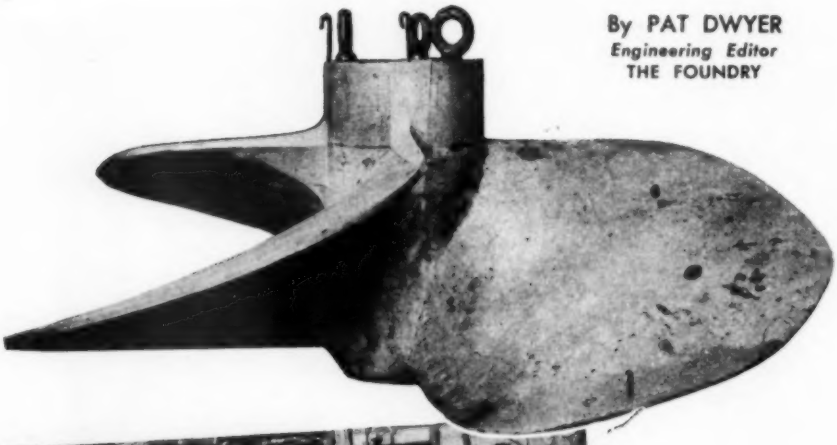
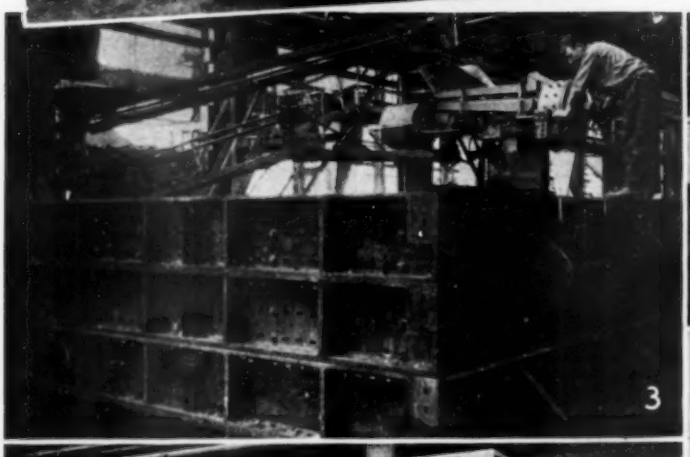
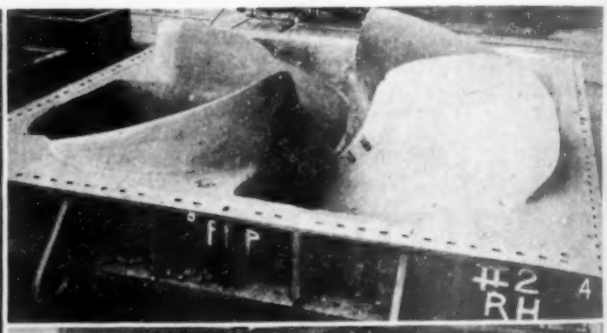
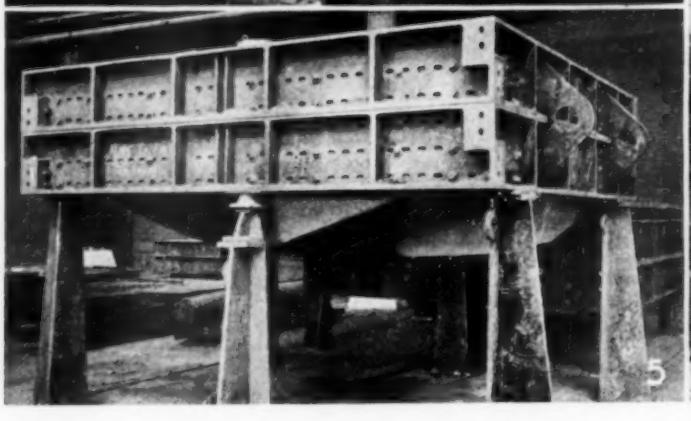


Fig. 1—Bronze pattern is provided with hub extension and lifting bolts. Fig. 2—Pattern is placed on the concrete match in readiness for ramming the drag. Fig. 3—A sand slinger is employed to fill and ram the sand in the drag. Fig. 4—Drag half of the mold after the pattern is removed. Fig. 5—Cope is lifted off and set up on cast iron standards. Fig. 6—Mold assembled for pouring







Revolutionary

NEW CRUCIBLE MELTING FURNACE

Without Burners in furnace body

At last, a major advancement in crucible melting furnaces! This new Radiant Combustion, Inc. furnace has been developed during the past two years and is now ready for production. Fired from the top cover, the flame is directed away from the crucible. Thus, the flame wipes the entire inside periphery of the furnace walls with a sheet of flame. *This method provides radiant heat.*

No other type of crucible melting furnace can possibly offer you so many advantages. It actually makes bottom fired, conventional types impractical. *Let us give you 18 reasons why*—based on actual operating tests.

Write for data on new crucible melting furnace

Radiant Combustion, Inc

BUILDERS OF EVERY TYPE (OIL, GAS, ELECTRIC) OF HEAT TREATING FURNACE

WARREN, OHIO

(*Concluded from page* 162)

present instance concrete is the medium employed.

A flask, later used as a drag, was laid on the floor and the bronze propeller pattern was blocked and wedged in the desired position. Sand was rammed all around the pattern and the parting surfaces struck off and tooled accurately. The flask to serve as a match then was lowered into position and filled with concrete, rough aggregate in the main body and finer material against the pattern and parting surfaces. The combination then was rolled over and the temporary drag removed and shaken out. Face of the concrete match was gone over carefully, touched up here and there where necessary and finished to a nice smooth surface. The specially constructed steel flask was machined on the flanges and in the ingeniously locked corners. The steel handles bolted to the sides also facilitate rolling the flask over when necessary.

In service the concrete-filled flask is laid on the floor and the bronze pattern is lowered into place. The drag flask, suitably reinforced with straight bars and auxiliary bars that extend into the pockets, is set in place and rammed full of sand by a sandslinger unit. A tile sprue is set up near one edge of the flask, and connected to a long horizontal runner terminating in a gate near the bottom of the hub of the wheel The two flask parts bolted together are rolled over and the concrete match is removed, leaving a drag with a ready-made parting surface all over. This surface is covered with paper or parting sand, and the cope flask is placed in position on the drag and rammed full of sand with the sandslinger. The tile sprue is continued to the top of the cope, and the hub of the propeller is continued full size first to the top of the cope, and later through an auxiliary flask about 3 ft high.

The cope is lifted off and placed face down on a number of high standards resting solidly on clean areas on the co crete floor. Here the surface is finish and blackwashed. The cope then dried in one of the large ovens. T pattern is lifted out of the drag, whi then is treated in the same manner.

On this particular pattern the top o one blade overlaps the bottom of th adjoining blade by 2½ in. To provid a straight lift for the cope a loose piec made of wood is pinned to the top edge of each blade near the hub, and is carried up with the cope.

The pouring basin extending over one side of the flask and supported on a temporary pedestal is filled with metal. Then a plug is lifted from the sprue to allow a steady stream of metal to enter the mold. Pouring from the ladle ceases when the metal appears in the riser. This permits the metal to drain out of the pouring basin. The remainder of the riser is filled with metal from a second ladle and poured directly into the open top.

WASHINGTON *Notes* ★★★

INCONGRUITY of the situation whereby national reconversion is being retarded through the inability of foundries to hire some of the thousands of war workers disemployed by other industries is emphasized by the decision that foreign labor—imported from Jamaica and the Barbados—will not be withdrawn until Dec. 1. This decision was reached last month as a result of a meeting between officials of WPB, OWMR and industry. Since VJ-Day there has been constant threat of complete removal of foreign labor from foundries, already short of help. Withdrawal of these workers after Dec. 1 is supposed to be orderly, but meanwhile the industry has no assurance that by that time it will be able to make up the loss in its working forces.

★ ★ ★

One of the numerous foundry bottlenecks impeding revival in civilian goods activities has been in production of cast iron soil pipe required in building construction. In August, 24 plants out of a total of 52 were closed, chiefly because of manpower difficulties. Most of these are preparing to resume work as fast as labor becomes obtainable, but until production has been stepped up materially building work cannot reach the levels forecast by potential demand for housing and industrial construction.

★ ★ ★

CEILING prices for copper castings and copper base castings priced by the "base period" method have been advanced 10 per cent by the OPA. The increase is designed to bring the levels of ceilings for castings priced by this method closer to those priced by the "formula" method.

In another price action last month OPA ruled that foundries could deliver or agree to deliver steel castings and railroad specialties at prices that may be adjusted upward if increases over present ceilings are subsequently permitted by the price agency. This action was taken pending a decision by OPA on the steel foundry industry's request for an increase in established ceiling prices.

★ ★ ★

SOME indication of the huge tonnage of castings that went into machine tool production during the war is obtained from industry figures showing that tool production from 1940 through July, 1945, reached a dollar value of nearly 4½ billion. This compares with approximately 747 million in the preceding five-year period, 1935 through 1939. Production for 1942 alone totaled more than 1¼ billion.

TERMINATION TIPS

FOR INFORMATION ON CONTRACT TERMINATION
CHECK YOUR NEAREST CONTRACTING AGENCY

★ ★ ★

Coke, heretofore free of inventory control, has been placed on a 20-day inventory basis as of Oct. 9. Pig iron continues on a 30-day basis under priority regulations. Other inventory limitations include 45 days on malleable iron castings and 60 days on gray iron castings. Inventory control over bentonite, among several other materials and manufactured products, recently was lifted.

★ ★ ★

MINIMUM trucking charge for cast iron scrap delivered by truck by the shipper or broker has been raised from $1 per gross ton to $1.50 by OPA, effective Oct. 13. The agency states this action should result in a saving to the consumer because the $1.50 minimum is below the charges the buyer would have to pay if the scrap were delivered by a trucking concern.

★ ★ ★

Allocations of iron and steel scrap to foundries and steelworks ended Oct. 1. All allocations previously issued remain in effect until the date of their expiration. Power to allocate scrap is retained by WPB, or, after Nov. 3, by the Civilian Production Administration, the organization that takes over with the dissolution of the War Production Board on that date.

★ ★ ★

SURPLUS Property Administration has been reorganized in the announced interest of speeding up disposition of the billions of surplus property left on hand at end of the war. Reminiscent of the evolution of WPB from its predecessor agencies, SPA has taken over functions of the old Surplus Property Board. Latest reorganization move is intended to decentralize among five assistant administrators the job of disposing of surplus goods.

★ ★ ★

One of the surplus items to be disposed

(*Concluded on page* 166)

MID-WEST PERFORMANCE *Tops them all*

Our engineer had a high mark to shoot at. Called in by a Milwaukee manufacturing company to test a Mid-West wheel on grinding steel forgings at highspeeds, he knew that he had to top the performances of three other reputable wheels.

This is how his report read after the test: "Our wheel out-performed the best competitive wheel in every respect. The Mid-West wheel cut faster, required less pressure, needed less dressing, held its shape better and cut cooler. The life of our wheel is about 20 per cent longer than the best wheel they have used so far."

Again, Mid-West tops them all!

MID-WEST ABRASIVE CO.

Manufacturers of DEPENDABLE Abrasives

OWOSSO, MICH. • DETROIT • ROCHESTER, PA.

(*Concluded from page 164*)

of is a group of aluminum plants that cost the government $700 million to build. Surplus Property Board recently prepared a report on these properties indicating that the corporations showing interest in the plants are: American Smelting & Refining, Reynolds Metals, Bohn Aluminum, Olin Industries, Columbia Metals, Henry Kaiser, and Alcoa. Inquiries also have been received from representatives of several foreign governments. Economical aluminum capacity of the United States currently is estimated at 1500 million lb of which Alcoa holds 828 million, Reynolds 162 million and the government 512 million lb. No small problem is the fact that 3 billion lb of aluminum inventories likely will overhang postwar markets for a number of years.

★ ★ ★

ADDITIONAL signs of the war's ending—WPB expired Nov. 3; the Controlled Materials Plan ended Sept. 30. After all of the various methods for allocating

TERMINATION TIPS

UNCLE SAM'S NO MIND READER—FILE YOUR TERMINATION CLAIMS PROMPTLY

scarce materials CMP finally was evolved, a simplified priorities rating system which worked successfully in final days of the war and which now is succeeded by only a few ratings designed to cover situations which are needed to guide the national economy back to a balance of supply and demand.

★ ★ ★

Equivalent of approximately 800,000 workers was added to America's war effort through wage incentive plans engineered by the Management Consultant Division, WPB estimates. More than one million workers came under wage incentive plans in 1944, and the reported increase in productivity totaled 40 per cent the first 90 days of operation, coupled with wage increases of 15 to 20 per cent, while costs dropped an average of 10 to 15 per cent. What the country seems to need now is an incentive plan that will get people to work at all.

W.G.G.

Clears Misconception Regarding Veterans

By C. CHARLES BURLINGAME, M. D.
Chairman
Subcommittee on Psychiatry of the NAM Medical Advisory Committee

WHAT are the practical implications of the term "neuropsychiatric" which has been applied to so many discharged veterans? In order to answer this question, I am expressing the following opinions as one of three psychiatrists to whom has been posed the very important problem of the effect on industry of releasing into civilian pursuits supposedly vast numbers of neuropsychiatric cases discharged from the armed forces.

We have been requested to make suggestions concerning what should be done with the so-called neuropsychiatric discharges whom industry is expected to employ or re-employ. It has been assumed that this problem is one separate and distinct from all other problems concerning postwar industry. I am happy to be able to report that, as a result of an extensive survey of various industrial organizations, this problem is not as serious as the layman may have imagined.

Psychoneurosis Not a Disease

By way of introduction, perhaps it would be well to state that the term "psychoneurosis" does not designate a disease in the sense that pneumonia, typhoid, or malaria do. The term psychoneurotic is more of a social diagnosis. It affects the individual relationship of all people to other people in their homes, in their employment, and in their social environment. A psychoneurotic requires an adjustment, as an individual, to his environment and occupation. Briefly, psychoneurosis may be defined as an emotional upset developed to the point where it interferes with the individual's efforts in his employment or with his domestic life or social relationships. Everyone, at one time or another, and in varying degree, exhibits such symptoms.

Obviously, the adjustment to military life for a man established in peaceful pursuits and relationships greatly affects his emotional life. If he fails in any of the required adjustments, he is discharged as a psychoneurotic. In civilian life, this same man might make a very satisfactory adjustment to his employment relationship and be an extremely valuable employee. The effort to make the necessary adjustments to military life may have caused increased irritability, seeming indifference, or other traits indicating a lack of the usual sustained and normal interests. These symptoms tend to disappear more or less automatically as the individual's war experience recedes in point of time.

Abnormal sensitivity to sound and an abnormal acuteness of hearing frequently call for special consideration. Again these symptoms are transitory and need not become the basis of any permanent difficulty in connection with peacetime employment.

The sum and substance of all this is that we need to pay little or no attention to whether or not a man was discharged from the armed forces as a psychoneurotic. This term, as a basis for discharge from the armed forces, amounts to nothing more than saying that he did not have the personal traits which enabled him to become a satisfactory member of the armed forces. The inability of a man to adjust himself to military life and conditions, does not imply inability to make a satisfactory adjustment to industrial or business occupations. Unfortunately, the term psychoneurotic, which has been used as a label for this entire group, has been greatly misunderstood by manufacturers and others in civilian life.

Satisfactory in Some Positions

Throughout industry there are thousands of psychoneurotic people being successfully employed. In the past, it may have been found that they were not suited to some particular job, but quite satisfactory in another position. They were never ruled out as undesirable for employment. There is no more reason to look upon the discharged veteran in that light. If emotionally upset through his war service, the return to normal conditions will soon restore him to his normal frame of mind.

I could dwell at length upon the observations upon which these conclusions are based, but one reference will be sufficient. In one large plant, employing tens of thousands of men, returned veterans are being hired without regard to the circumstances surrounding their discharge from the armed forces; the sole basis for employment is the veteran's past training and skill. No attention whatever is being paid to whether he was discharged as a psychoneurotic. After a period of months of employment, the work record of these veterans was compared with that of non-veteran groups. It is of interest to note that nearly one-third of the veterans rated higher in productivity than the average of the entire plant; and a little over one-third of these veterans had developed higher skills than they had before entering the armed forces.

Furthermore, there seemed to be no connection whatever between the success or failure in industrial work between the veterans discharged for neuropsychiatric reasons and those discharged by the armed forces for other reasons. Hence, I am forced to the conclusion that the presence or absence of psychoneurosis as a discharge factor in the armed forces has no bearing whatsoever on re-employability.

Takes New Office

R. D. Wood Co., selling agents for Florence Pipe Foundry & Machine Co., announces the removal of its office to 1072 Public Ledger Bldg., Philadelphia 5.

SPOs for Reconversion

SPO No. 100 Series Jolt Squeezer Machines, CANTILEVER Type.

SPO No. 200 Series Jolt Squeeze Stripper Machines, CANTILEVER Type.

SPO No. 300 Series Jolt Stripper Machines.

SPO No. 500 Series Jolt Rockover Draw Machines.

FAST and ACCURATE . . . PROVEN SO in WAR PRODUCTION

You have probably heard the semi-wisecrack: "Difficult things we do promptly; the impossible ones take a little longer." The pressure of war made that saying come true. Standards of quantity *with* quality which were once little more than hoped for have come to be matter-of-fact—all in the day's work.

SPO Molding Machines have stood up pleasingly under the pounding of war. They have helped set new production records. They need no design overhauling. Their inbuilt speed and accuracy can now show to even better advantage in meeting the permanently higher demands of peacetime operation.

Seen here are typical SPO's. There are others like them. All together, they cover a wide range of foundry requirements. They are the expression of many years' experience as practical foundrymen.

No reconversion delays at SPO. We are ready to serve you. What are your requirements?

SPO No. 100 Series Jolt Squeezer Machines, POST Type.

SPO No. 200 Series Jolt Squeeze Stripper Machines, POST Type.

SPO No. 400 Jolt Squeeze Rockover Draw Machines.

MEMBER

MANUFACTURERS ASSOCIATION, INC. FOUNDRY EQUIPMENT

Bulletins showing capacities and specifications of SPO Molding Machines will be supplied upon request.

SPO

INCORPORATED

Manufacturers and Specialists in Molding Machines, Vibrators and Patterns for Production

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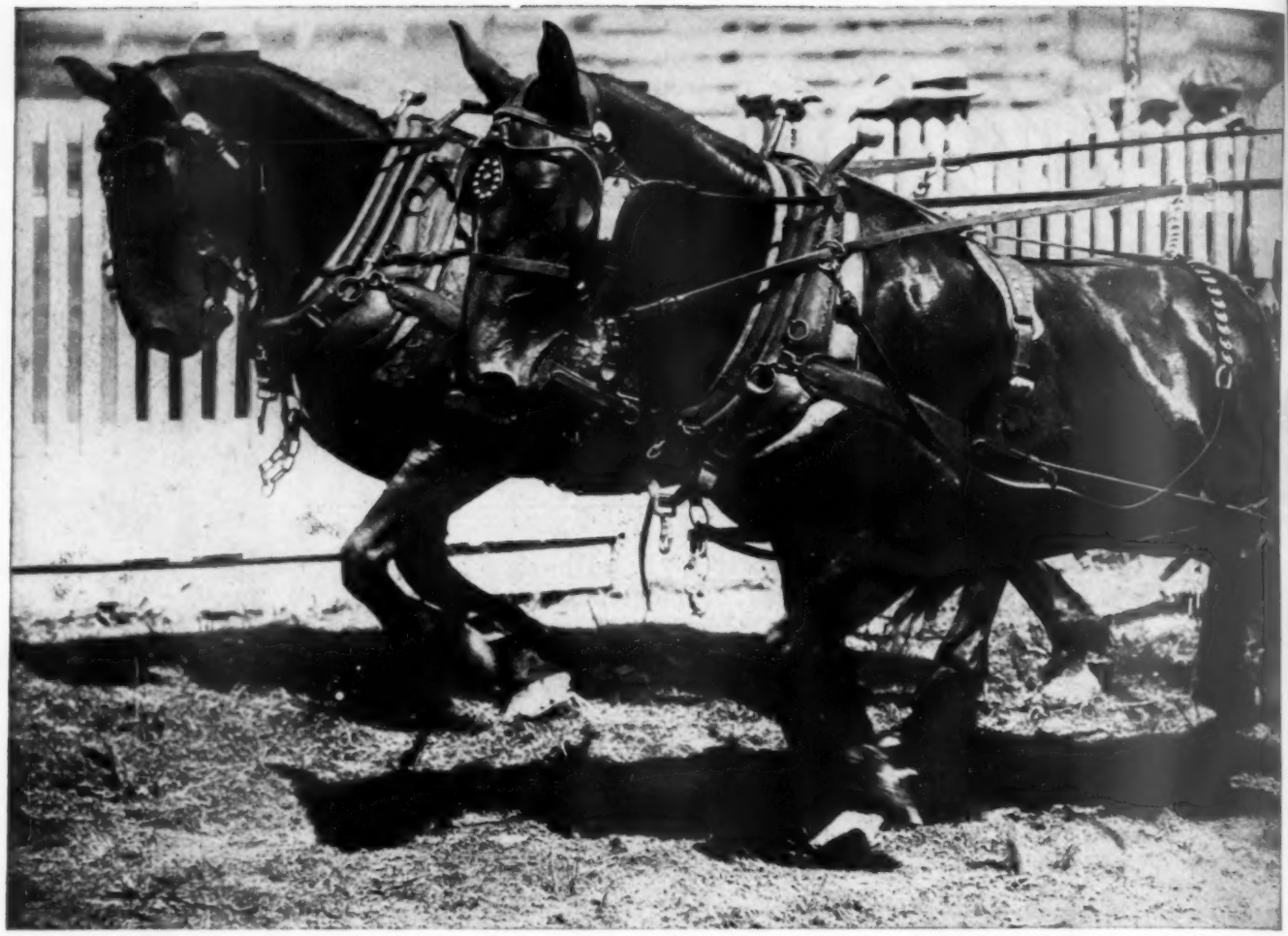


A Great Pair
FOR THE HARD PULL

PROFITABLE casting production takes a lot of hard work. You can make the grade easier when you use MOGUL and KORDEK Binders to produce quality castings.

You can depend on them to save binder costs . . . reduce baking time and cleaning costs . . . increase oven capacity and core production.

MOGUL is a perfect Green Bond, which increases permeability in cores. Use MOGUL in cores for both green and dry strength.

MOGUL works with core oil; it decreases drying time and yields smooth cores. MOGUL works perfectly with pitch or resin, too, because cores can be handled while still warm. MOGUL is widely used with sharp sands.

TEAM UP WITH
MOGUL *and* KORDEK
You can depend on them

KORDEK

KORDEK is a perfect DRY BOND which can be used in smaller quantities than most dry binders. KORDEK produces better castings with fewer discards.

CORN PRODUCTS SALES CO. 17 BATTERY PLACE NEW YORK 4, N. Y.

Activities of foundry GROUPS

Western New York

MORE than 300 members and guests turned out for the second annual Victory outing held by the Western New York Chapter, AFA, at Sturm's Grove, Buffalo, Sept. 15. Chairman Arthur H. Suckow presided and distributed prizes for high scores for games of skill, participated in throughout the afternoon. Several card games also were in progress throughout the afternoon and evening. Hamburgers, hot dogs, clams, fresh corn on the cob made up the food menu, which was served buffet style from 3 until 9 p.m. A generous supply of liquid refreshment was on hand to wash it down.

Everyone seemed to have an enjoyable time and the chapter extends its appreciation and thanks especially to the following outing committee members responsible for the success of the affair: Outing chairman, Albert R. Amann; reception and tickets, A. J. Heysel; refreshments, Frank Bates; prizes, Fred L. Weaver; games, Harold Hadsell; publicity, Leslie C. Thellemann.—*Leo A. Merryman, secretary.*

Pittsburgh

BENEFITS accruing from modernization of foundry operations as well as marketing practices were effectively illustrated by Lester B. Knight, consulting engineer, Chicago, and guest speaker at the Pittsburgh Foundrymen's Association's initial meeting of the 1945-46 season in Pittsburgh, Sept. 17.

Every foundry must be constantly on the alert to modernize its thinking, production methods and facilities in order to insure quality products at low unit costs in meeting postwar competition not only from within its respective industry but from other industries, Mr. Knight stated.

No two foundries present identical conditions, so it is paramount that the modernization program be developed to fit local conditions with sufficient flexibility to allow efficient operation under varying work loads. Until relatively recently the jobbing or production jobbing type foundry believed that modernization and mechanization was all right for a production foundry, but could not be applied to its own conditions, he said. Some jobbing foundries did get into financial difficulties by trying to copy production equipment for jobbing requirements. Today, however, there are many modern, mechanized (to a degree) jobbing and production jobbing foundries that are highly successful.

After proper consideration of the overall layout, based on the mission the foundry is expected to accomplish, a detailed analysis of requirements and costs should be developed to illustrate the economics of the proposed changes, Mr. Knight stated. The foundry industry is a feast and famine business, hence any major expenditure should be self-amortizing in direct material and labor savings in not more than three years' operation.

Foundry modernization involves the following four basic steps, according to Mr. Knight:

1. The personnel must be properly organized with clear cut lines of responsibility, and authority commensurate with that responsibility.

2. Establishment of closer control of the variables affecting the production of high quality castings at low cost, such as hourly or daily inspection of the scrap, etc.

3. Development of more thorough knowledge of costs of the various operations in the plant, without which it is impossible to put emphasis on those operations or departments where unit costs are high and thus make the necessary changes in methods, procedures, personnel or facilities to secure low cost unit output.

4. Mechanization of facilities wherever possible, but only after an analysis and survey of each of the several departments in the plant, with a close check on production methods and costs in each department. The departments include yard handling, melting, hot metal handling, molding, coremaking, baking, finishing and handling, shakeout, casting cleaning, finishing and handling.—*Joseph C. Sullivan.*

Birmingham

OVER 600 Birmingham district foundrymen and friends enjoyed the 12th annual picnic of the Birmingham Chapter, AFA, at the Roebuck Country Club, Sept. 8. Howard A. Nelson, Hill & Griffith Co. did an excellent job in handling the sale of tickets which resulted in one of the largest crowds ever to attend the picnic.

Charles B. Saunders, chairman, J. M. Bates, co-chairman, and W. Guy Bagley, Wayne B. Nelson and Howard A. Nelson constitute the entertainment committee for the new season and they really saw to it that everyone had all of the barbecue and delicacies that go to make a picnic a real success.

The afternoon program included golf, swimming, horseshoe pitching and softball. Two soft-ball teams, picked from the foundrymen and captained by Harry Mouat and Gene Welchel, put on a game filled with enthusiasm, home runs, spectacular plays and occasional miscues. Captain Welchel's team was the winner for the second straight year. The winning battery was composed of Hugh Smith, pitcher, and Herbert Strickland, catcher; the umpire was Frank Robinson who called 'em as he saw 'em

Ticket stubs went into a hat, and after dinner lucky number drawings by Harry Mouat saw prizes go to R. E. Greer, Gilbert Allen and a top prize of a $25 Victory Bond to R. M. Schmidt.

Dan B. Dimick was sergeant-at-arms for the occasion, while Morris Hawkins is co-chairman of the program committee.

Abe Holberg, who last year secured 59 memberships for the Birmingham Chapter, was again nominated chairman of the membership committee for 1945-46 which includes M. L. Carl, Donald C. Abbott, L. L. Stone, M. E. Manuel, John F. Wakeland, J. Arthur Hill and George Vann, co-chairman.

Arthur Woody, chapter president, has named J. A. Bowers chairman of the program committee for the new year, and already a number of outstanding speakers have accepted Mr. Bowers' invitation to speak before the chapter.—*J. P. McClendon, publicity director.*

Twin City

OPENING meeting of the season for the Twin City Chapter, AFA, held Sept. 19 at the Curtis Hotel, Minneapolis, had 94 members and guests in attendance. Chairman R. C. Wood, Minneapolis Electric Steel Casting Co., outlined some of the plans that have been made for the season's activities.

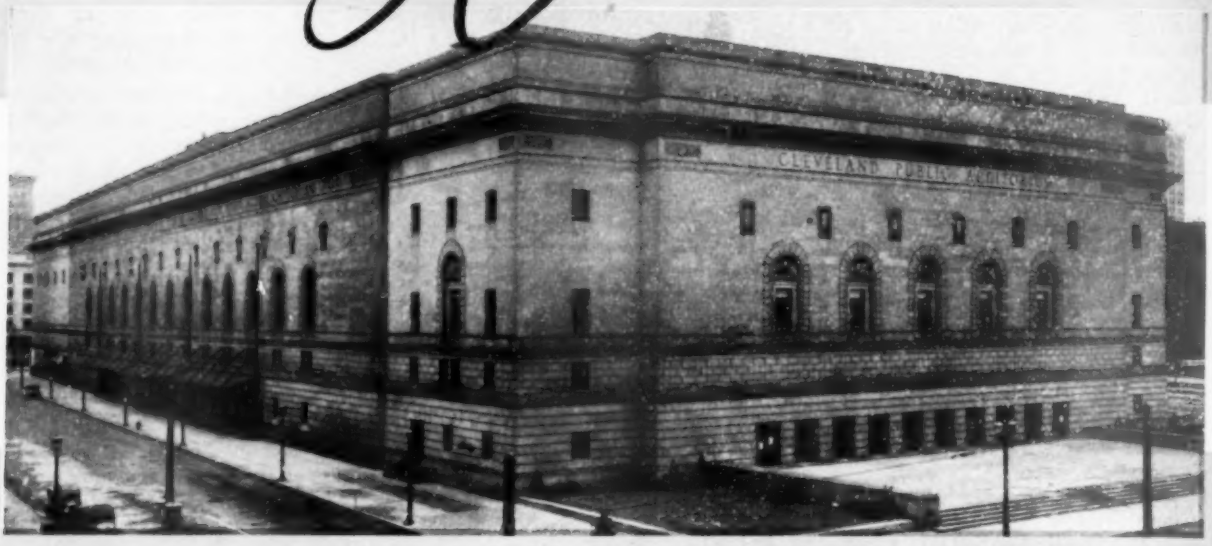
J. A. Gitzen, president, Delta Oil Products Co., Milwaukee, was the speaker, discussing "Core Problems in the Foundry." He first dealt with the various types of core binders and the general problems associated with them. Core binders were grouped into the organic type, which burn and produce gas at temperatures up to 1000 F, and the inorganic, which are inert until higher temperatures are reached. Mr. Gitzen stressed the importance of oven conditions in baking cores properly, and predicted that in the future a change in oven equipment would make possible the thorough baking of cores in a matter of minutes.

The second phase of his discussion dealt with core washes, the purpose of which is to close voids at the core surface, prevent contact of metal and sand, raise the fusion point of the sand, and form a seal around the core. He also spoke of his own product, Permi-Bond, a substitute for seacoal which becomes volatile

(*Continued on page* 172)

1896 GOLDEN

50th Annual



Cleveland and the facilities of its great Public Auditorium has been selected by The American Foundrymen's Association to be the scene of the fiftieth annual convention and exhibition May 6 to 10, 1946. Geographically located in the heart of the foundry industry, the selection of Cleveland to be the first postwar convention city assures a tremendous attendance of interested foundrymen.

Foundrymen will find much new and improved foundry equipment and the latest developments in materials, supplies and accessories on exhibition in Cleveland's spacious arena and underground halls. Technical sessions and discussions of benefit to the thousands of foundrymen attending the convention are scheduled throughout the week. Plan now to attend the convention and spend this "foundry week" in Cleveland renewing old acquaintances, making new ones and participating in the program of exhibits, technical sessions and social events being arranged for you.

THE FOUNDRY

A Penton Publication

PENTON BUILDING CLEVELAND 13, OHIO

JUBILEE! 1946

Foundry Convention

CLEVELAND AUDITORIUM
MAY 6-7-8-9-10, 1946

● *The FOUNDRY* for April 1946 will be the Pre-Convention Issue. It will be a preview of the convention and will highlight the exhibit and the programs of activities for the various days. In addition to all of the regular editorial articles and departments, the April issue of *The FOUNDRY* will carry added features that will make it one of the finest issues ever published.

● *The FOUNDRY* for May 1946 will be the Post Convention Issue. It will present the story of the show, a report of the technical sessions plus all the interesting and valuable material contained in every issue throughout the year—a combination that will make this Post Convention issue another valuable addition to your library of foundry literature.

For all foundrymen everywhere these two issues of *The FOUNDRY* will be of outstanding interest and to all who sell and serve the foundry industry these issues present an important advertising opportunity.

54 YEARS OF CONTINUOUS SERVICE TO FOUNDRYMEN — *wherever metals are cast*

(*Continued from page* 169)

at elevated temperatures and in decomposing leaves only a trace of ash.

Door prizes, donated by E. R. Frost Co., Minneapolis, were won at the conclusion of the meeting by Paul Richardson, D. W. Oman & Sons, and E. M. Meagher, Chicago Retort & Fire Brick Co. —*J. W. Costello, reporter*

New England

THE New England Foundrymen's Association opened its 1945-46 season at the Engineers' Club, Boston, Sept. 12 with an attendance of over 100 members and guests.

Arthur J. Tuscany, executive secretary and treasurer, Foundry Equipment Manufacturers' Association, Cleveland, was guest speaker and gave a most interesting talk on "Foundry Industry Problems and Suggestions for Meeting Them." Mr. Tuscany outlined the work that foundries had done during the war, and gave credit to the industry for the progress in mechanical and technical developments. In his opinion, the principal need in the foundry today is a better merchandising of its products. He stated that in some cases 25 years of progress in the foundry was accomplished during the four-year war period but that in the postwar period the number one problem of merchandising must be attacked by the foundries.

He spoke about the present tendency of getting away from the individual sales by the company itself and the better progress that had been made in this line through organized effort. Mr. Tuscany showed a number of slides which gave a summary of a survey that the FEMA made among 600 of the leading educational institutions in the country with reference to their policies and plans for training students in foundry subjects.

At the conclusion of the address A. B. Root Jr., New England representative of the Gray Iron Foundry Industry Advisory Committee to the OPA, spoke briefly concerning the administration of Price Regulation 244 and its present status since the termination of the war. —*Merton A. Hosmer, president.*

New Jersey

A PROMISING outlook in gray iron was pictured by speakers at the first fall meeting of the New Jersey Foundrymen's Association at the Newark Athletic Club, Newark, N. J., Sept. 28. Backlogs are accumulating, and with labor supply improving (it is now beginning to show an actual gain at some district foundries) an increase in the melt is expected over the coming months.

Prospects in steel castings are less encouraging, however, demand having dropped off sharply with the ending of the war and with little immediately in sight to take up the war-expanded capacity. Also it was indicated that demand for non-ferrous castings has tapered somewhat since the surrender of Japan and that foundries in this field are shifting rapidly from a 48-hour to a 40-hour weekly schedule.

H. L. Edinger, chairman of the Gray Iron Advisory Committee to OPA and president, Barnett Foundry & Machine Co., Irvington, N. J., reported on the committee conference with OPA at Chicago on Sept. 26 and explained the recently issued Amendment 10 to MPR 244.

Results of all recent union negotiations and War Labor Board cases in local foundries were discussed, and Charles Seaman, eastern representative, National Founders Association, reported on the labor situation in the East and other parts of the country.

Edward McErlear, personnel manager, Worthington Pump & Machinery Corp., reviewed the problems involved in securing economical and efficient adminis-

(*Continued on page* 174)

BIRMINGHAM: More than 600 members and guests of the Birmingham Chapter, AFA, participated in the 12th annual picnic, Sept. 8, at Roebuck Country Club. (Photos courtesy J. P. McClendon, Stockham Pipe Fittings Co.)

More proof

that the naked eye is not enough

Fabricator forced to reject 33⅓% of shipment—and it could have been avoided by foundry x-rays

Because of an unusually slow production rate and high cost, caused by internal flaws revealed during machining, a lug fabricator decided to x-ray all castings as they came from the foundry. An average of 34 out of every 100 received proved internally unsound and were returned—an expensive procedure for the foundry. Because only internally sound lugs were released to the fabricator's production line, total machining cost was greatly reduced even after the charge for radiography was included.

This case history proves what many a foundryman has learned to his profit—radiography, by showing what is wrong, helps make better castings . . . replacing costly rejections with customer goodwill.

You'll save by using radiography

With industrial x-ray, you just won't send castings out that will give either you or your customers "rejection" trouble. You'll save time and money, too.

Radiography, besides being a great helper in correcting faulty casting technic, is a dependable guide—a guide that topflight designers use before making basic changes in design, materials, or processing.

Radiography has established itself as an essential industrial tool. Use it to improve your products and develop new markets. Call your local x-ray equipment dealer—he'll tell you how.

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography

ANALYZES . . . INSTRUCTS . . . CORRECTS . . . IMPROVES

Kodak

(*Continued from page* 172)

tration of the New Jersey workman's compensation law. This proved of special importance because of the 35 per cent average increased benefits scheduled to go into effect next January.

John L. Carter, cost consultant, Gray Iron Founders' Society, urged all local foundries to send in a reply to the cost survey now being conducted in the Newark area.

The following were re-elected directors of the association for the coming year: J. R. Campbell, Campbell Foundry Co., Harrison, N. J.; H. L. Edinger; M. J. Hogan, Bierman-Everett Foundry Co., Irvington, N. J.; J. C. Phelan, Eastwood Foundry Co., Paterson, N. J.; A. E. Winstead, Moore Bros. Co., Elizabeth, N. J. and P. R. Van Duyne, Meeker Foundry Co., Newark. William Z. Taylor, Taylor & Co., Brooklyn, was elected to the board to fill the unexpired term of K. V. Wheeler, American Steel Castings Co., Newark, who is now located in Chicago.—*Ben K. Price.*

Rochester

ROCHESTER Chapter of the AFA opened its new season at Hotel Seneca, Rochester, Oct. 9, with a number of out-of-town guests and several new members among the large group in attendance.

Max T. Ganzauge, General Railway Signal Co., and a director of the chapter, gave a few high lights of his recent experiences in Europe, where he was sent to investigate certain phases of the foundry industry there.

E. H. Schleede, U. S. Gypsum Co., Chicago, as principal speaker of the evening, presented an interesting talk on the use of gypsum cement in the foundry and pattern shop. With the aid of a sound slide picture, together with practical demonstrations, Mr. Schleede made clear the details of good practice in the use of these materials. Various gypsum cements are finding wide use today for making intricate patterns that must be held to close tolerances.

Regular meetings of the chapter for the balance of the season will be held the second Tuesday of each month at Hotel Seneca.—*D. E. Webster, publicity.*

Chicago

TO START off its 1945-46 season on Oct. 1, Chicago Chapter, A.F.A., chose to delve into the realm of economics. Speaker for the dinner meeting, held in the quarters of the Chicago Bar Association, was Harland H. Allen, president, Harland Allen Associates, Chicago, consulting economists and counsellors in finance and investments; author of two books—*Whither Interest Rates* and *The Businessmen's Stake in American-Russian Friendship;* and president, Chicago Consumers Co-operative Inc. His subject was "Consumer Co-operation—A Formula for Full Employment Without Deficit Spending or Regimentation."

Pointing out that nondurable goods production is not much reduced from a year ago and is 58 per cent more than the average of the five years preceding the war—this accompanied by a 10 per cent larger employment—Mr. Allen posed the question of whether purchasing power is 58 per cent larger than in the five years before the war.

Mentioning atomic power, he pointed out that few people are happy about it. Even without this disturbing element, there is reason to believe the nation already is afraid of its productive capacity. This, the speaker asserted, is because of the disbalance between productive capacity and consuming capacity.

It is a fallacy, Mr. Allen declared, for business to be urged to build new factories when they are unable to dispose of the products of existing factories. Among the means available for increasing buying power, he mentioned taxing by the government, raising wages and guaranteeing minimum wages, and reducing prices.

Referring to monopolies, the speaker stated he is not in favor of the government setting the yardstick, such as in the power industry, for there always is the possibility that all costs may not be included, thus the yardstick may not be a fair one. As to consumer co-operatives, he believes they can be, and in the future probably will be, effective in fields where the consumer feels he is being exploited.

Next meeting of the chapter, Nov. 5, will feature the first of the series of roundtables, with sessions sponsored by the gray iron, malleable, nonferrous and steel divisions.

The chapter has accepted an invitation of the Chicago section of the American Institute of Mining and Metallurgical Engineers for a joint meeting on Jan. 9. This will replace the chapter's regular meeting which otherwise would have been on Jan. 7.—*Erle F. Ross.*

Michiana

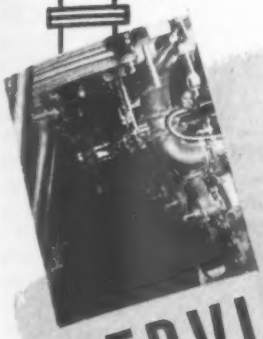
DR. J. A. RIDDERHOF, manager, foundry facing department, Frederic B. Stevens Inc., Detroit, was the principal speaker at the season's first meeting of the Michiana Chapter, AFA, Oct. 2, at the Hotel Whitcomb, St. Joseph, Mich. W. V. Johnson, chapter chairman, presided, with Arthur Nelson, Chicago Hardware Foundry Co., Elkhart, Ind., and chapter program chairman, introducing the speaker.

Dr. Ridderhof gave an interesting talk on facings, explaining that graphite will stand the highest temperature of materials

(*Continued on page* 176)

SOUTHERN CALIFORNIA: Dinner scene at eighth annual outing of Southern California Chapter, AFA, at Lakewood Country Club, Long Beach, Calif., Aug. 4. About 500 members and guests were on hand

B&W DIRECT-FIRING PULVERIZED-COAL CIRCULATING SYSTEM



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SIMPLE INSTALLATION
Only one pulverizer with a single circulating line for pulverized coal required by the system.

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Space at furnaces clear for product handling — pulverizer at a distance — circulating loop overhead.

FLEXIBLE MULTI-FURNACE OPERATION
As many take-offs to burners as needed. Burners may be turned on and off as desired.

INCREASED FURNACE OUTPUT
Existing installations show shorter heating cycles with lower fuel consumption per ton of castings.

SUSTAINED FURNACE CAPACITY
Pulverizer maintains its rated capacity in coal to the fineness required by the installation.

UNIFORM FURNACE TEMPERATURE
Temperatures easily controlled, by methods similar to those used with gas and oil firing.

FOR SIMPLIFIED FIRING OF METALLURGICAL FURNACES, investigate the B&W Direct-Firing Pulverized-Coal Circulating System. Its economy and efficiency have been proved on billet heating, reheating, forge, malleable-iron annealing, zinc fuming and other types of metallurgical furnaces.

This method of firing is equally applicable to other metallurgical furnaces, including ingot, bloom and billet heating furnaces; normalizing furnaces; copper, lead, and zinc melting furnaces; multiples of small units such as small forge furnaces and process heating furnaces in chemical industries.

The same B&W pulverizers, used in this system are also providing economical *direct-firing* of individual furnaces. For further details, write for Bulletin 3-333.

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PM-108

(*Continued from page* 174)

used. Bentonite is used principally to keep the mixture in suspension. All facings should be mixed mechanically if at all possible. A small amount of water should be placed in the mixer first, then a proportionate amount of blacking powder should be added and mixed thoroughly. Keep repeating this until the entire mix is made. Dr. Ridderhof also pointed out the best procedure to use when facing molds and cores of various sizes, how to dry properly, the proper temperature for drying, etc.—*H. B. Voorhees.*

St. Louis

REGULAR monthly meeting of the St. Louis District Chapter, AFA, was held at the DeSoto Hotel, Sept. 13. Chairman Walter E. Illig welcomed all guests and thanked the members for the splendid attendance which totaled 155 dinner guests and 20 who attended the meeting only. Vice Chairman Roland T. Leisk outlined the program committee's efforts to provide an interesting and informative program for the ensuing year and briefly mentioned some of the speakers already obtained to take part in the program.

Walter Zeis, chairman of the membership committee, reported 176 paid-up members on record as of July 31 and expressed optimism of exceeding last year's membership total. The chairman introduced Mr. Roth of the Hadley Vocational Schools and also advised that this school had a foundry trades course, as well as apprentices available, and it would be glad to furnish pamphlets relative to the course on foundry trades.

L. C. Farquhar, works manager, American Steel Foundries, East St. Louis, Ill., read an article written by Mr. Stokes, concerning the splendid war record of a fellow member, Col. Carter W. Bliss, who is serving with the 72nd Ordnance Group in Germany, and described an incident of his period of service. Attendance prize of $5 in war stamps, was won by Ben Hard, St. Louis Steel Castings Co.

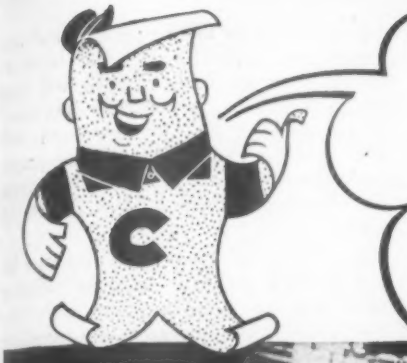
Chairman Illig then turned the meeting over to Carl Morken, general superintendent, Carondelet Foundry, St. Louis, who introduced A. V. Magnuson, vice president, Champion Foundry & Machine Co., Chicago, and J. Howard Ware, general sales manager, Redford Iron & Equipment Co., Detroit. Mr. Ware explained coreblowing while demonstrating the blowing of various types of cores and core boxes furnished by a number of St. Louis foundries. A question-and-answer period followed, with Carl Morken, A. V. Magnuson and J. H. Ware, in charge.

J. D. Walsh, works manager, Scullin Steel Co., St. Louis, explained coreblowing operations at his plant, especially in connection with the manufacture of anchor chains which were cast in 90-ft. lengths, each link weighing approximately 35 lb. each.

Charles Broz, superintendent, Na-

(*Continued on page* 178)

MICHIANA PICNIC: Showing some of the members and guests of the Michiana Chapter, AFA, who attended the group's annual picnic at the Christiana Country Club, Elkhart, Ind., Sept. 15. (Photos courtesy of R. E. Schalliol, American Foundry Equipment Co., Mishawaka, Ind.)



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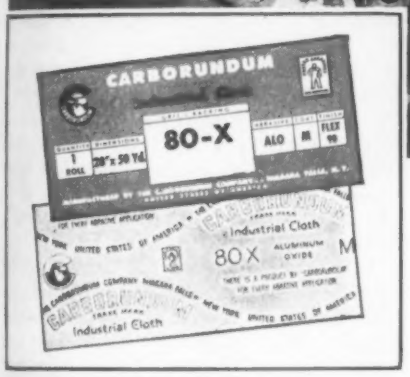

NOW the Coated Abrasives by "CARBORUNDUM" have the specifications clearly and simply marked on *both* the labels and backing materials! Thus, when the material is in use in the shop, you can tell what to requisition from the stockroom. And the stockroom, from either labels or backing material can tell at a glance what to ask the purchasing department to reorder. A glance at the picture of label and backing will tell you how this new marking system for Coated Abrasives by "CARBORUNDUM" makes it easy to identify, specify and order this popular line of coated abrasive products. The Carborundum Company, Niagara Falls, New York.

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(*Continued from page* 176)

tional Foundry Co., St. Louis, gave an excellent demonstration of coreblowing with his own equipment, describing the methods and speed of operation. The meeting was thoroughly enjoyed by all present and after adjournment the exhibits were left open for further personal discussions.—*Lee H. Horneyer, secretary-treasurer.*

Central Indiana

CORRECTING Waste in the Foundry" was the subject discussed by A. J. Edgar, technical advisor, Gray Iron Founders Society, Washington, on Oct. 1, before the Central Indiana Chapter of the AFA at Indianapolis.

Mr. Edgar pointed out initially that in 1944 the production of gray iron was only half of its potential capacity and that the waste attendant with the process was a serious handicap to the industry. The problem of correction was broken down into several factors, the most important of which was the cupola. This factor was discussed at length, detailing its operation and high lighting the points which contribute to waste of materials in both quality and quantity.

The composition of cores, sand handling and conditioning, gating and risering, and patterns were all briefly discussed in their responsibility of waste. In conclusion it was emphasized that the future of the industry depended upon the production of sound castings, the accomplishment of which required the elimination of much of the waste now prevalent.

George Clark, metallurgist, Cummins Engine Co., served capably as technical chairman of the meeting.—*B. P. Mulcahy, historian.*

Texas

TEXAS has done it again! It must have had the influence of Admiral Nimitz, since the Texas Chapter, AFA, served sirloin steaks at their first fall dinner—and we mean capital "S-S." These foundrymen must have been saving their red points all during their "summer vacation."

The chapter inaugurated the 1945-46 season with a very successful and very pleasant first fall meeting, attended by an unexpected overflow crowd, held at the Golfcrest Country Club in Houston, Sept. 13, where extra tables had to be set, and where the late-comers had to be "satisfied" with a ½ lb sirloin strip, instead of the regular 1 lb dinner steak.

An interesting paper was given, with accompanying slides, by Mr. Morton of International Nickel Co., on the application of castings in the petroleum industry, which was followed by a general discussion by the group.

Following the general discussion, the policy of the chapter for the coming year, as formulated by the chairman, Ed P. Trout, was detailed when the season's program was outlined by the program chairman, William M. Ferguson.

Higher education in the foundry industry is to be stressed. All affiliated with the foundry industry realize the importance of apprenticeship and training, but this year the Texas Chapter will look further than into the required operational functions of the foundry, and will delve into the management, development and research, by an educational program in co-operation with Texas A & M College.

A two-day program is planned to be held at the college campus during November, to interest students in the possibility of the foundry as a vocation as beneficial and as advantageous as any other, and certainly one that gives a person an opportunity to utilize his greatest imagination and initiative for his own advancement, as well as the development of the industry.—*Ralph Mumford, publicity chairman.*

Heads Texas Chapter

Editor's Note: We recently asked Ed Trout to send us his photograph and biographical data in order that we might present a suitable announcement of his election as chairman of the Texas Chapter of the AFA. His reply seemed more adequate than any sketch we could compose, consequently it is published here verbatim:

"You should be asking for my obituary and not for a biographical sketch. After my last trip East I wouldn't even make a good corpse. Life is becoming too complicated.

"If your magazine is in such dire need

E. P. TROUT

of photographic material for your 'Rogues Gallery,' I submit attached hereto a replica of my countenance, taken before the development of the second chin. Incidentally, this crude attempt is a result of my being both the subject and the photographer, the shutter lens snapping by a time release. I was very proud of this suit of clothes, and I was more interested in photographing my haberdashery than the countenance.

"My present position is vice president and foundry manager of Lufkin Foundry & Machine Co. Previous to my return to Texas some four years past, I served as Pacific coast manager of this company for its oil field operations. We have an assembly plant on the Pacific coast and do a little manufacturing, but principally are a sales and service organization. Purdue got rid of me in 1925 or thereabout.

"I am very inactive in ASME and AGMA. When my name appeared in the AGMA *Who's Who*, they were harder up for printing space than I hope you will ever be. My being chairman of the Texas Chapter, AFA, is a result of losing a golf match, the winner avoiding the responsibility. Why I ever forsook photography for golfing, I'll never understand.

"If you can make anything from the above worth printing, it will amaze me."

Metropolitan

QUESTIONS arising between producers and consumers of castings came in for extensive discussion at the first fall meeting of the Metropolitan Chapter, AFA, held at the Essex House, Newark, N. J., Oct. 1, and attended by more than 115.

R. B. Elms, purchasing agent, Sperry Gyroscope Co. Inc., Brooklyn, spoke from the buyer's standpoint and Don Reese, International Nickel Co., New York, from the foundryman's.

Mr. Reese was called upon at the last minute to take the place on the program of E. C. Hoenicke, Eaton Mfg. Co., Detroit, who was unable to attend because of adverse flying conditions. Sam Tour, New York, served as technical chairman and "referee" after the meeting had been turned over to him by Horace A. Deane, American Brake Shoe Co., New York, new chairman of the chapter.

Mr. Elms stated that three questions frequently arise in the buyer's dealings with foundries: (1) Who is to pay for inspection jigs and gages required for the foundry's own inspection of the castings?; (2) who is to pay for castings rejected after machining?; and (3) what time limitations can be placed upon rejection of castings and can castings be rejected to the foundry after lying in the consumer's stockpile for several months?

Don Reese believed the buyer should furnish the inspection jigs required, as they can make them cheaper than the foundry, in his opinion. When they are not supplied, the price of inspection fixtures should be figured in the selling price.

He also believed that the producer is basically responsible for the castings produced, although work done on castings after leaving the foundry should be considered. Heat treatment may distort and crack castings, he pointed out; further, castings often are subjected to improper usage by the users and therefore should not be chargeable to the foundry.

Mr. Elms, in raising the question as to who should pay for castings after machining, said there was no doubt the foundry should pay for castings showing

(*Continued on page* 182)

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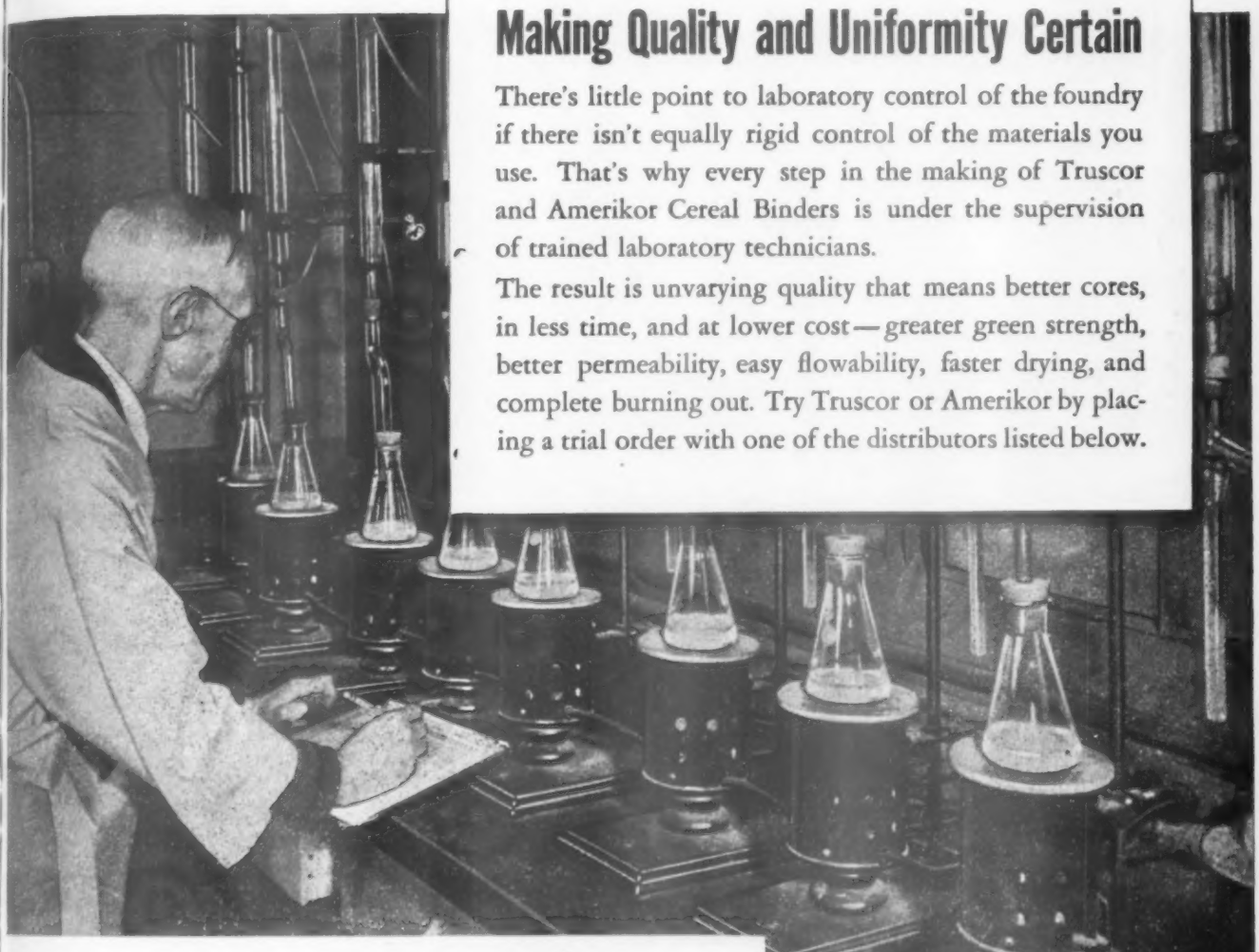
Truscor AND Amerikor CEREAL BINDERS

(Light Weight) (Heavy Weight)

Making Quality and Uniformity Certain

There's little point to laboratory control of the foundry if there isn't equally rigid control of the materials you use. That's why every step in the making of Truscor and Amerikor Cereal Binders is under the supervision of trained laboratory technicians.

The result is unvarying quality that means better cores, in less time, and at lower cost—greater green strength, better permeability, easy flowability, faster drying, and complete burning out. Try Truscor or Amerikor by placing a trial order with one of the distributors listed below.



Quicker Mix! Blends with All Binders!

Greater Green Strength! No Sag!

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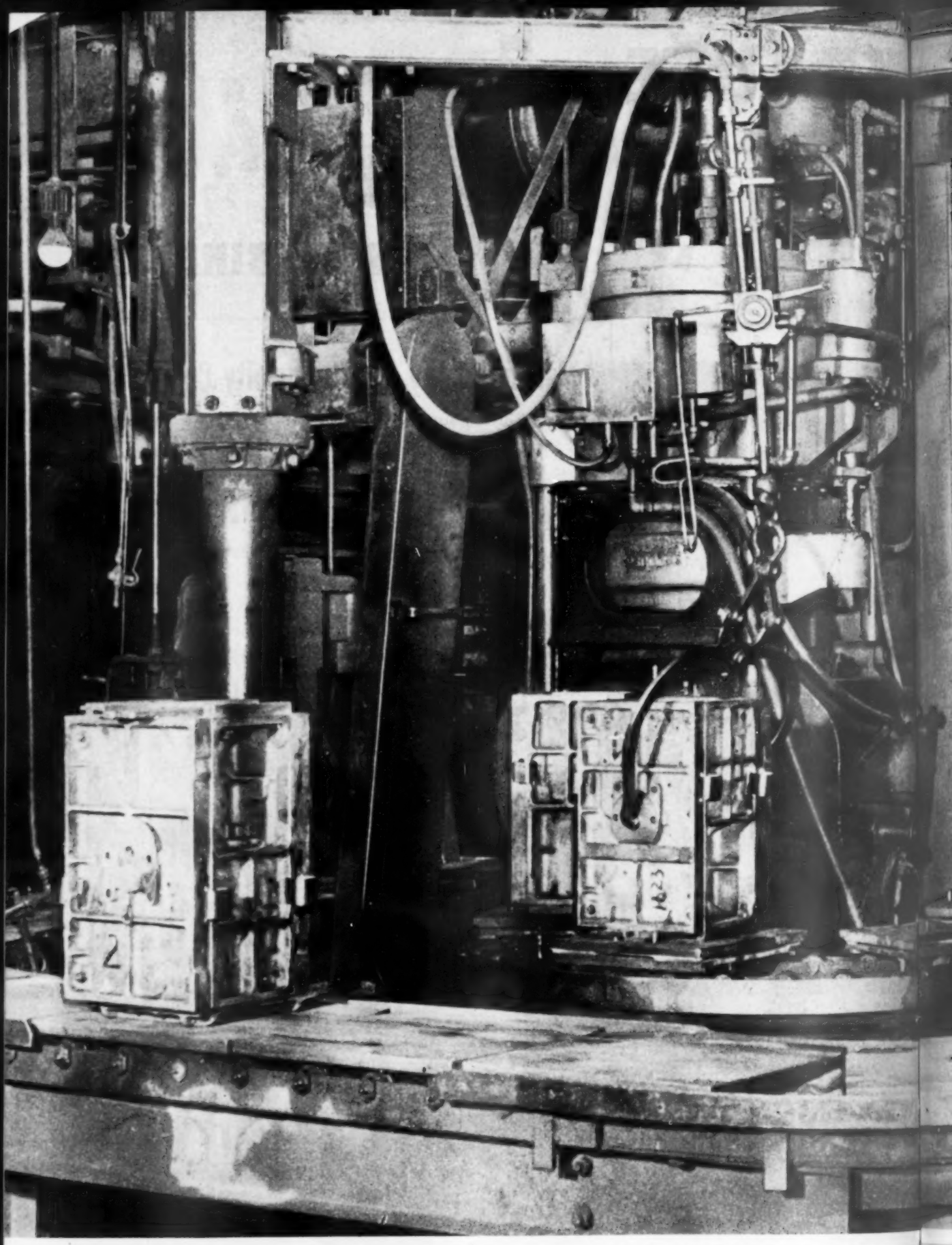

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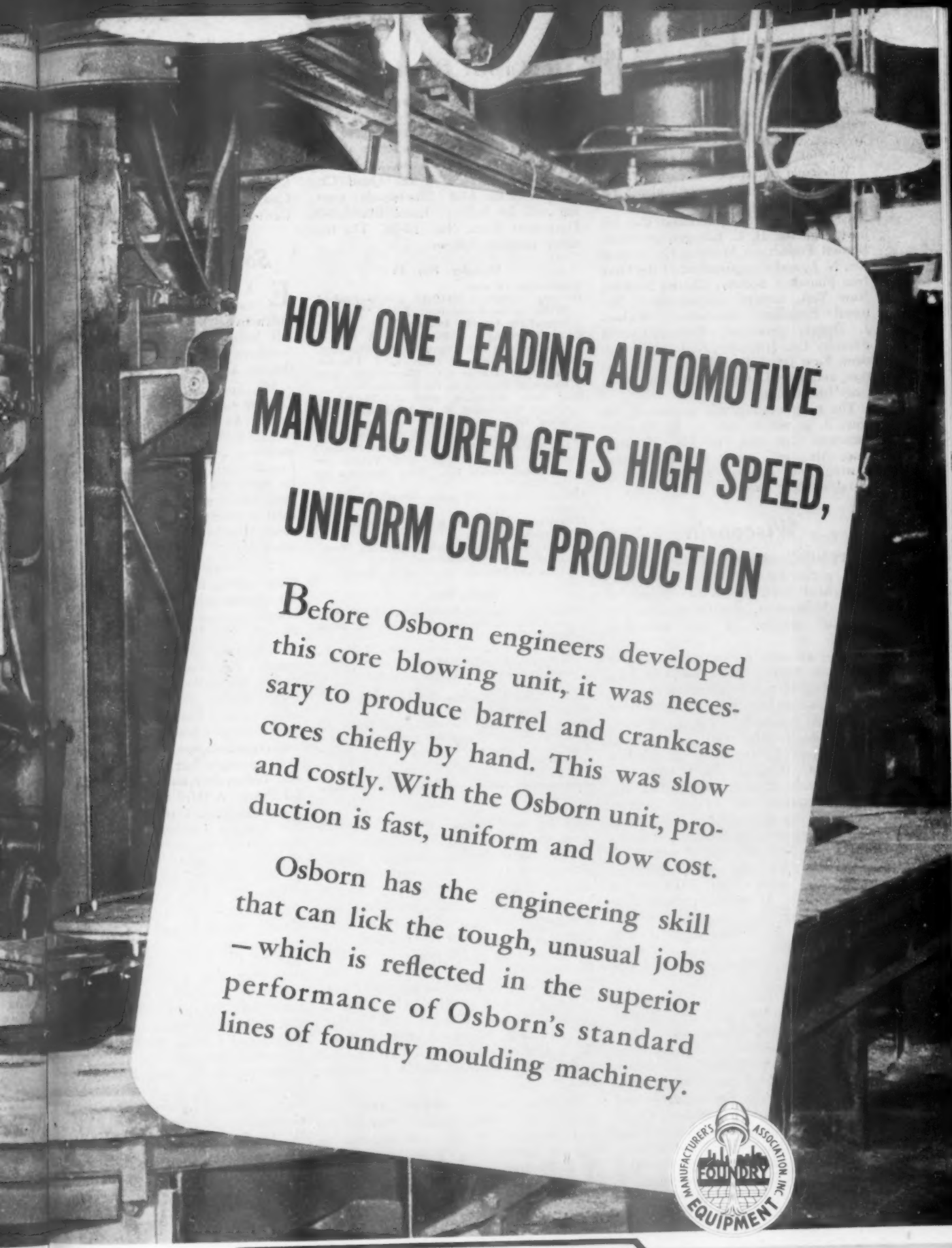

HOW ONE LEADING AUTOMOTIVE MANUFACTURER GETS HIGH SPEED, UNIFORM CORE PRODUCTION

Before Osborn engineers developed this core blowing unit, it was necessary to produce barrel and crankcase cores chiefly by hand. This was slow and costly. With the Osborn unit, production is fast, uniform and low cost.

Osborn has the engineering skill that can lick the tough, unusual jobs — which is reflected in the superior performance of Osborn's standard lines of foundry moulding machinery.

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

OSBORN

MOULDING MACHINES

(*Continued from page* 178)

foundry defects upon machining. But when castings do not meet drawing dimensions after machining or partial machining, the question arises as to who is at fault. General opinion usually places burden of proof upon the user.

Wholesale rejection of castings that have been stocked in users' plants for months is unfair to the foundry.

Chairman Deane introduced the following guests: H. L. Edinger, president, Barnett Foundry & Machine Co., Irvington, N. J., and vice president of the Gray Iron Founders' Society; Charles Seaman, New York, eastern representative, National Founders Association; Michael J. Hogan, president, Bierman-Everett Foundry Co., Irvington, N. J., and president, New Jersey Foundryman's Association; and John L. Carter, cost consultant, Gray Iron Founders' Society.

The next meeting was announced for Nov. 5, at which time C. K. Donoho, American Cast Iron Pipe Co., Birmingham, Ala., will speak on "Centrifugal Casting and Ferrous and Nonferrous Metal."—*C. J. Law*

Wisconsin

OPENING meeting of the 1945-46 season for the Wisconsin Chapter, AFA, held Sept. 14 at the Schroeder Hotel, Milwaukee, was devoted to five technical sessions of the individual groups.

The gray iron group, presided over by Frank Kulka, Motor Castings Co., had four speakers who discussed the subject of sand reclamation. Speakers were William A. Hambley and A. L. Stewart, Allis-Chalmers Mfg. Co., and Ronald Webster and E. Den Breejen, Hydro-Blast Corp., Chicago. Discussing the economic side of sand reclamation, Mr. Webster stated that savings depend largely on the size of the plant. Considering the power, fuel, labor and maintenance involved, the cost of reclaiming sand over a seven-year period in existing installations varied from 50 cents to $1.50 per ton. It was also stated that units operating on 3 tons per hour, or 24 tons per day, are practical and economical. The equipment cost itself is approximately $10,000 per ton per hour.

In describing the thermal process of sand reclamation Mr. Stewart said that although it is used successfully on low clay sands in aluminum and steel foundries, the method still is in the laboratory stage for gray iron foundry application.

The joint session of the malleable and technical groups had W. B. Sobers, Chain Belt Co., as speaker. He discussed the development of an economical reliable and flexible method for routine control analysis by applying colorimetric methods in conjunction with the combined method of chemical analysis for alloyed and unalloyed cast iron, malleable iron and steel. Factors involved in sampling gray iron and malleable for carbon determinations also were discussed.

S. Mueller, the Falk Corp., presided over the steel group session, which was given over to a discussion of neck-down risers. Sam Bellus, Burnside Steel Foundry Co., Chicago, explained the subject, illustrating various applications by use of slides. The meeting then was given over to questions, which were answered by a panel of "experts" consisting of John Wiedephul, Wehr Steel Co.; Carl Haertel, Falk Corp.; Milt Karrer, Crucible Steel Casting Co.; Frank Limacher, Bucyrus-Erie Co.; Victor Ziemer, Maynard Electric Steel Casting Co.; Anthony Herrmann, Racine, Wis.; Ed J. Daehn, Pelton Steel Casting Co., and Gene Schneider, Grede Foundries Inc.

Program for the pattern group included two films, depicting the design and production of steel castings, and a talk on manufacture of pressure plates. A. F. Pfeiffer, Allis-Chalmers Mfg. Co., presided, and William Elsner, Atlas Match Plate Co., Chicago, was the principal speaker. Considerable discussion ensued on how to eliminate air pockets in making pressure plates. Cost was given at approximately $2 a pound, or an average of $40 a plate in a 12 x 16-in. size. Most production foundries are demanding pressure plate work in the attempts to eliminate all loose gates.

Speakers for the nonferrous session were Nathan Janco, Centrifugal Casting Machine Co., Tulsa, Okla., on the subject of "Centrifugal Castings," and John Putchinski, Allis-Chalmers Mfg. Co., on "Latest Developments in Casting Nonferrous Metals."—*Walter Gerlinger, publicity chairman.*

Regional Conference Program Announced

Papers and discussions relating to various phases of foundry practice are included in the program for the coming regional conference of the Quad City Chapter of the AFA. The two-day meeting will be held at Hotel Blackhawk, Davenport, Iowa, Nov. 15-16. The tentative program follows:

Thursday, Nov. 15

Registration—9 a.m.
Opening address — 10-10:30 a.m. — Fred J. Walls, national president, AFA, "The Future of the Foundry Industry."
General meeting — 10:30 a.m. — 12 noon — "Mechanizing and Improving the Foundry."
Luncheon meeting—12 noon—L. J. Fletcher, Caterpillar Tractor Co., "Community Relations and Training in the Foundry."
Gray iron, malleable, steel—2-3:30 p.m.—Charles Schureman, E. F. Schundler & Co., Joliet, Ill., "Sand Control."
Nonferrous—2-3:30 p.m.—W. B. George, R. Lavin & Sons, Chicago, "Brass and Bronze."
Gray iron—3:40-5:10 p.m.—J. S. Vanick, International Nickel Co., "New Horizons for Cast Iron."
Malleable—3:40-5:10 p.m.—Roundtable meeting.
Nonferrous—3:40-5:10 p.m.—Aluminum and Magnesium.
Banquet—6:30 p.m.—Strickland Gillilan, Washington political observer, news analyst, author and lecturer, "North of the Ears."

Friday, Nov. 16

General meeting—10-11:50 a.m.—J. A. Gitzen, Delta Oil Products Co., "Core and Mold Surface Coatings."
Luncheon meeting—12 noon—Prof. Walter L. Daykin, University of Iowa, "Modern Relationship Between Top Management and Supervision."
Gray iron—2-3:30 p.m.—Cupola operation.
Malleable—2-3:30 p.m.—(Open)
Steel—2-3:30 p.m.—Roundtable meeting.
Nonferrous—2-3:30 p.m.—(Open)
General meeting—3:40-5:10 p.m.—"Centrifugal Castings."

Southern California

E. K. SMITH mixed iron with human nature in a manner diverting and instructive when he made the principal talk before the Sept. 14 meeting of the Southern California Chapter, AFA, at the Los Angeles Elks Club.

Mr. Smith's subject was China, the Chinese and Chinese foundry operations. As an Army Ordnance Department officer, on loan to the State Department and detailed to help Chinese foundries make castings for military use, he spent many months in that teeming land where gray iron is regarded as almost a precious metal and where technical knowledge is venerated as in no other place.

"The average casting operation in China yields about 65 per cent scrap," Mr. Smith said. The equipment is a conglomeration of the primitive and the modern, with little enough of the latter.

"There is never an oversupply of metal. Pig iron as well as nonferrous metals are gathered and hoarded with a care that would be funny if it were not so pathetic. There was nothing of the WPB about Chinese metal distribution and organization. One plant would have raw materials but no orders. Another had orders but nothing with which to fill them. A third would boast an electric furnace, but would have no iron. Yet I never saw such earnest workers nor such sincere seekers after knowledge. China is certain to become one of our greatest markets."

John E. Wilson, Climax Molybdenum Co., chairman of the chapter's educational committee, outlined in detail the ambitious program which his group will conduct this winter. Five papers, each occupying one evening of discussion, will be given during late January and throughout February. These will cover specifications, patterns, molds and cores, gating and risering practice, and finally inspection and repair of castings. Separate committees have been appointed for each of these phases of the program. Robert Gregg, Reliance Iron Works, is chairman of the papers committee and W. D. Bailey Jr., Westlectric Castings Inc., will direct publicity for this educational work.

Well over a hundred members and guests attended the chapter's Oct. 12 meeting at the Clark Hotel, when a three-part program of fine talks devoted to light metals was presented. C. C. Moffett, Bohn Aluminum & Brass Corp., gave an excellent paper on "Foundry

(*Continued on page* 184)

All Cores O.K.!

For every Sand—the Right Grade of Certified Core Oil

Certified Golden Core Oils, identified by their color, are made from the most select raw materials. Usually termed "conventional core oils."

Certified Unique Core Oils give the same results as our Golden Core Oils, but are made from off-colored materials which are dark in color and cost much less.

Certified Rapidry Core Oils are new core oils, also dark in color, and considerably lower in price. They bake quicker in the oven or at a lower temperature and provide more readily collapsible cores.

There is no formula for a core oil which will give the best results under all foundry conditions; which is why we have long insisted that "core oils must be prescribed."

Each of the three general types of Certified Core Oil is manufactured in several grades of binding strength — the highest strength being equivalent to that of raw linseed oil—and the lowest being the grade used to spray cores for added surface toughness. Our "prescriptions" are made by experts and are based on years of experience and the knowledge acquired in serving thousands of foundries. To top it all, the cost will in most cases be less than that of the core oil you are now using.

Every gallon must live up to our claims—completely satisfy the user—or may be returned for full credit.

CERTIFIED CORE OIL & MFG. CO.

"The House of Dependability"

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Stock and Representatives: Buffalo, N.Y. Elmira, N.Y. Worcester, Mass. Reading, Pa. Newark, N. J. St. Louis, Mo. Milwaukee, Wisc. New Orleans, La. Houston, Tex. Chattanooga, Tenn. Minneapolis, Minn. Portland, Ore.

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means precision in METALLURGICAL TESTING EQUIPMENT

"Buehler equipment is made finer than might be considered absolutely necessary for laboratory work, but it certainly is a pleasure to use it." This remark made by a well known metallurgist is typical of the opinion throughout the field where Buehler testing equipment is used. If you use Buehler equipment you have the best.

STANDARD POLISHER NO. 1500

Accurately polished specimens can be produced with speed and ease with Buehler polishers. The sturdy construction and vibrationless operation help to prevent pitting and amorphous film. The 8" polishing disc is attached to a tapered arbor on the motor shaft by means of a stout sleeve. This construction feature reduces peripheral vibration to a minimum. The standard polisher is a complete unit with a direct mounted ¼ h.p. radial thrust ball bearing motor. 115V., 60 cycle, AC, single phase, with selective speeds 575 and 1150 r.p.m. controlled by a mounted switch with handy lever.

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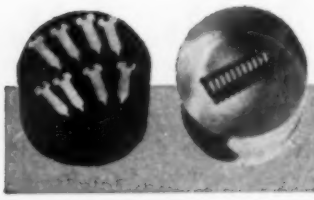


Buehler Ltd.
A PARTNERSHIP
METALLURGICAL APPARATUS
165 West Wacker Drive, Chicago 1, Illinois

(*Continued from page* 182)

Procedure and Practice in the Extrusion Plant." His remarks attracted much interest on the part of metallurgists present.

L. M. Nash, Magnesium Products Inc., talked on "Melting and Casting of Magnesium." Mr. Nash laid especial stress on the necessity of care in employing only sound crucibles in melting magnesium, and avoiding dangers of fire and explosions due to faulty equipment. Details of molding sands used in the magnesium foundry and other practices also were ably covered.

Lt. G. Gribble Jr., of the Navy's Destroyer Base foundry and pattern shop, offered an interesting discussion on "Heading, Gating and Chilling of Aluminum Castings." His remarks were predicated on the Navy's practice at this base, and evoked considerable discussion despite lateness of the hour.

Southern California Chapter's Christmas party is set for Saturday evening, Dec. 8, at Lakewood Country Club. The chapter's education program, it has been announced, will be offered in late January and February, and details now are being completed. Announcements regarding speakers and their subjects are expected to be made shortly.—*James B. Morey, publicity chairman.*

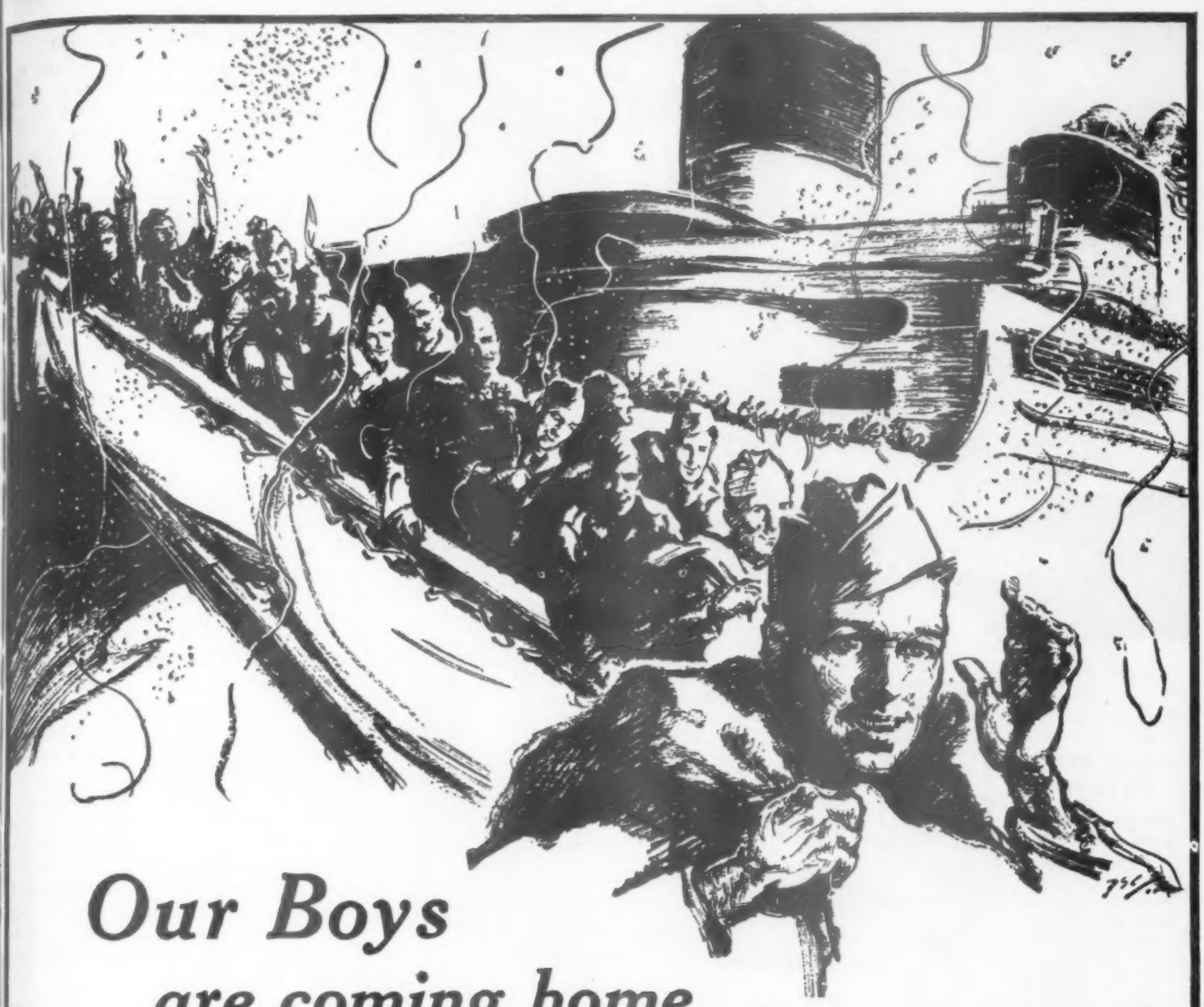
Northeastern Ohio

APPROXIMATELY 150 members and guests attending the Oct. 11 meeting of Northeastern Ohio Chapter, A.F.A., at the Tudor Arms Hotel heard two speakers discuss widely different subjects in a highly interesting and informative manner. Harry T. O'Connor, special agent in charge of the Cleveland office of the Federal Bureau of Investigation, talked on the FBI's experience in preventing a serious attempt at sabotage in the early days of the war. Dr. H. A. Schwartz, manager of research, National Malleable & Steel Castings Co., presented a scholarly and scientific discussion on "Solidification of Metals."

In the intermission period President A. C. Denison announced that the membership of the branch continues to increase in a gratifying manner. The present list of members exceeds that of last May when 30 members were absorbed by the newly-formed Northwestern Pennsylvania Chapter. L. P. Robinson (Bob, himself) explained a change in the method of handling the ticket sales for the proposed Christmas party at the Carter Hotel. Unfortunately, the hotel walls are not rubber and up to the present no method had been discovered for crowding from 1200 to 1400 guests in a space designed to accommodate a maximum of 1000. Mr. Robinson, in his usually gentle and persuasive manner, earnestly requested the boys to order their tickets early.

The lecture by Dr. Schwartz, illustrated by many slides and dealing with

(*Continued on page* 186)



Our Boys are coming home

and the ball has been passed to us!

"AND SO, My Fellow Countrymen, Today I Report to You that Your Sons and Daughters Have Served You well and Faithfully with the Calm, Deliberate, Determined Fighting Spirit of the American Soldier and Sailor. Their Spiritual Strength and Power Has Brought Us Through to Victory. They Are Homeward Bound—Take Care of Them."

GENERAL DOUGLAS MacARTHUR

From speech to the people of the United States following Japanese surrender aboard the U.S.S. Missouri, Sept. 3, 1945.

To You 86 DSM Service Men: Here's Godspeed and Hoping You'll All Be Back with Us Soon—We Know You'll Be Proud to Get Back Again with Your DSM Associates Who Remained at Home and Who Didn't Lose One Single Hour Due to Grievances or Strikes!

WEDWORTH V. BAKER
Pres. D.S.M.

WM. BUSH
Vice-Pres. D.S.M.

WALTER BAKER
Capt. A.C.

WM. J. BAKER, II
Pfc. A.C.

LEW O'DONNELL, *Superintendent*

DETROIT SHEET METAL WORKS

DETROIT - 6 - MICHIGAN

DSM
INDUSTRIAL OVEN
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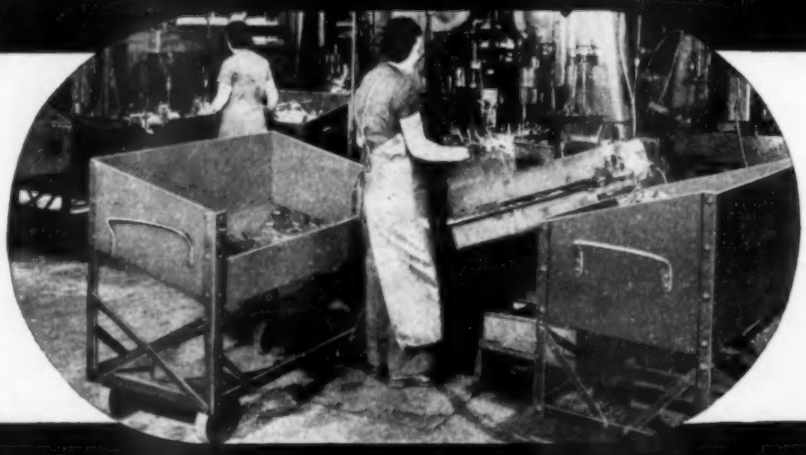
DETROIT SHEET METAL WORKS
DETROIT MICH. U.S.A.

IN THE OLD BATTLE



FOR NEW WAYS

ASK FOR CATALOG

Shows user 100 different styles and sizes of shop boxes, barrels, trucks, tool boxes and cabinets, bench legs, drawers, bins, racks, etc.

to reduce production costs

. . . improved materials handling, because so often neglected, probably holds greater promise than any other factor. Production is aptly called "materials in motion"—*in* machines as well as *between* them and other departments. This often calls for special shop containers and equipment, built to fit individual needs, because daily production costs and efficiency of equipment are paramount considerations.

We make stock as well as special sizes and models, embodying special features to suit individual requirements.

ORIGINAL IDEAS!

Photo above shows shop trucks built for Soss Mfg. Co., Detroit, replacing conventional "tote boxes". Where, as in this plant, successive operations are numerous, calling for frequent moves of products between machines or departments, this idea has many time-saving advantages.

STEEL FACTORY EQUIPMENT DIVISION
Cleveland Wire Spring Company
5250 BROOKPARK ROAD • CLEVELAND 9, OHIO

Cleveland
STEEL SHOP EQUIPMENT
STOCK STYLES FOR GENERAL UTILITY
BUILT-TO-ORDER to meet special requirements

(*Continued from page* 184)

the scientific principles underlying (... solidification of metal was a condensatio... or abridged version of the Third Annu... Foundation Lecture sponsored by the... AFA. Complete text has been printed in... pamphlet form and distributed to the... members. An abridged version prepared... by the author was presented in the... September issue of THE FOUNDRY. Obvi... ously it is impossible to further condense... the material into the space allotted to... activities of the chapters. It is equally... obvious that a few random quotations... would not do justice to the importance... of the subject. Interested readers may... order pamphlets containing the entire... lecture from the AFA. —*Pat Dwyer.*

Cincinnati

CHARLES K. DONOHO, metallurgist, American Cast Iron Pipe Co., Birmingham, was principal speaker at the Oct. 8 meeting of the Cincinnati District Chapter. Discussing "Cast Ferrous Metals," he covered the subject both in its broader aspects and with respect to his experiences at his own plant.

Among the phases treated were the many variables affecting centrifugal casting technique, the value of ladle inoculation in producing static castings, and the making of high strength, corrosion resisting bolts by permanent mold casting. This last item bears some similarity to the machine production of glass bottles. Another point discussed was the substitution of centrifugally cast steel for forgings in such applications as aircraft engine cylinder barrels and propeller shafts for ocean vessels.

Next meeting of the Cincinnati group will be held Nov. 12, with Dr. Scott W. Smith, the Kelley-Koett Mfg. Co., Covington, Ky., speaking on "X-ray as Applied to the Foundry Industry."—*William H. Hoppenjans Jr., secretary.*

Saginaw Valley

THE Saginaw Valley Chapter, AFA, opened its 1945-46 season, Oct. 4 with a National Officer's Night at Frankenmuth, Mich. This meeting was the first one held since the Saginaw Valley Group severed its ties with Detroit Chapter and started on its own. The official "baby rattle" was presented to Chairman H. G. McMurry by Fred Walls, national president.

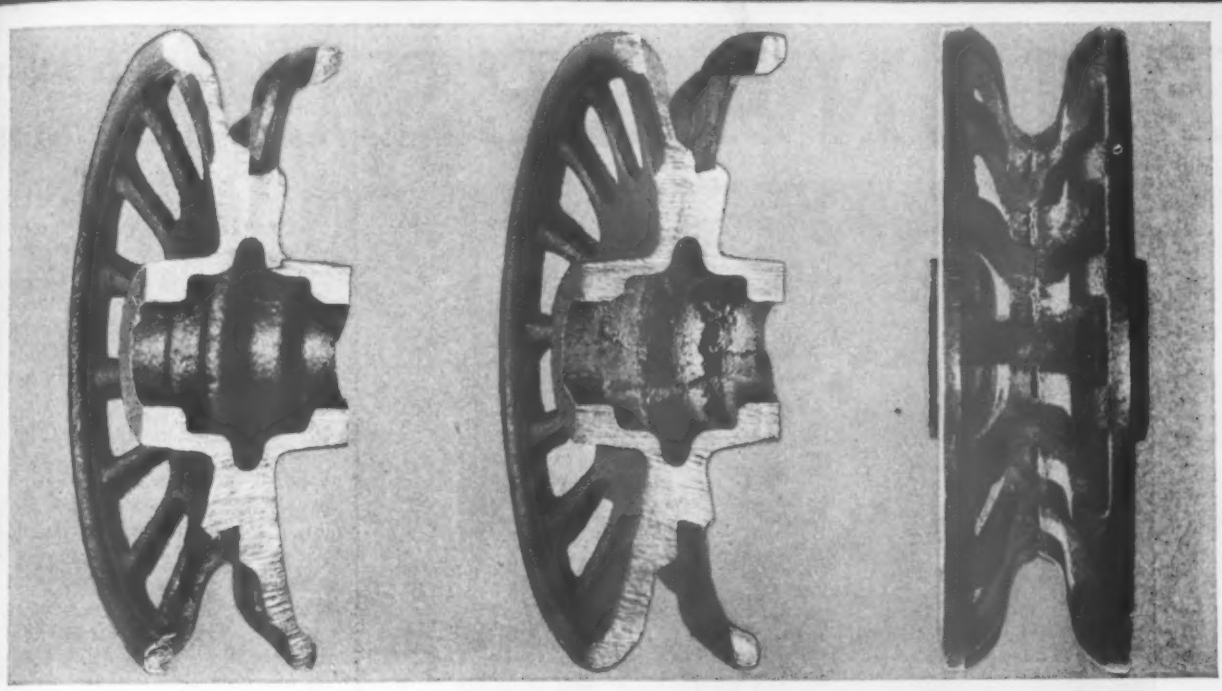
Accompanying Mr. Walls were W. W. Maloney, national secretary, Herb Scobie of the Chicago office staff, and Joseph Sully, director, of Ontario.

Plans for local educational lectures sponsored by the Saginaw Valley Chapter this winter were announced. Lectures will be selected from local talent.

Principal speaker of the evening was Fred Carl of Delco-Remy Division of General Motors. His topic was "Factors in the Production of Aircraft Quality Nonferrous Castings." Mr. Carl gave an

(*Concluded on page* 188)

Korglaze



FOR PROCESSING CORES TO A SMOOTH SURFACE.

FOR PREVENTING METAL PENETRATION.

FOR PROTECTING A FINE LINE OF CLEAVAGE BETWEEN CORE AND CASTING.

KORGLAZE is a vehicle for use with graphite or talc in coating cores. It can be applied quickly through spray, dip or swab. Drying out rapidly, it leaves the graphite or talc tightly bonded to the core.

Illustrated above is a bronze casting. For demonstration purposes, one half of the core used had its surface coated with KORGLAZE; the other half was untreated. The finer finish against the KORGLAZED half, as seen in the photograph, is true to type, and can be counted on in EVERY CASE WHERE KORGLAZE IS USED. Casting to truer dimensions, saving excess metal and easing off on machining are some of the things that KORGLAZE permits.

Every foundry needs KORGLAZE for the problem job that is bothering now, or the one that is sure to come tomorrow. KORGLAZE is a perpetual aid to the making of finer castings.

UNITED OIL MFG. CO.

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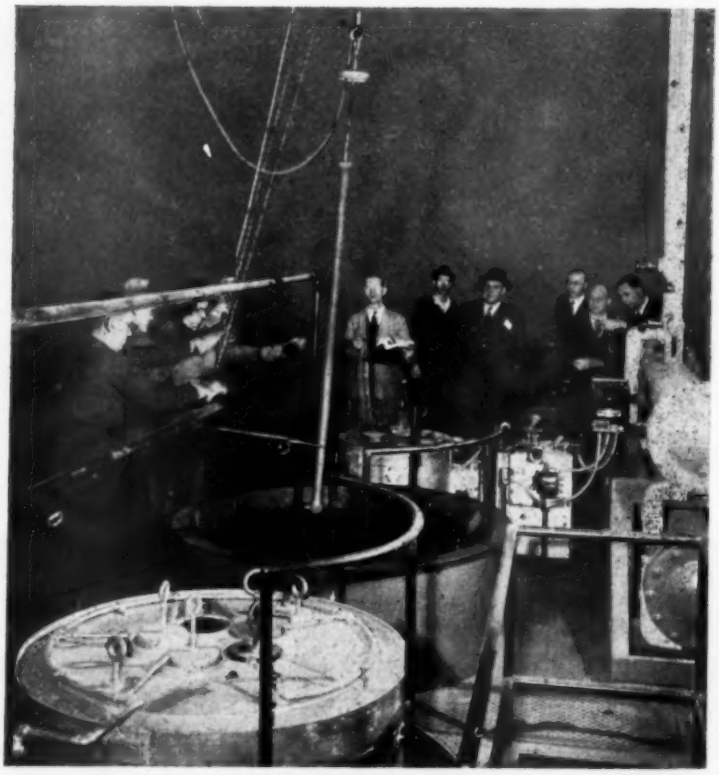
BELLEVUE *Controlled Atmosphere* FURNACES



In the construction of BELLEVUE "Controlled Atmosphere" FURNACES, painstaking consideration of the job to be done comes first. Every factor must be evaluated, every condition studied. Only then do Bellevue engineers attempt design and recommendation of furnace type. The soundness of that policy is being demonstrated in plant after plant. Hundreds of executives in scores of varied companies have proved, to their own satisfaction, the efficiency, speed, high production level and operating economies of BELLEVUES that were "designed" for the job. You, too, will find Bellevue experience and facilities a profitable investment for your own furnace needs.

SEND FOR FULL DETAILS

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INDUSTRIAL FURNACE CO.
2975 BELLEVUE AVE. DETROIT 7, MICH.

(*Concluded from page* 186)

illustrated talk dealing with the defe encountered in aluminum castings i aircraft engines and the methods u in eliminating them. Among defe listed were: Residual stresses, dro s, pi hole porosity, oxide films and cold shu and shrinkage.

Much of the talk centered about c 'inderhead castings; apparatus for vac 'm removal of gas from cylinder hea cores during pouring was shown. Also, th measurement of residual stresses on head after heat treatment was illustrated. Th last portion of the meeting was devote to questions and answers. — *Joseph J Clark, publicity.*

GLAMOUR IN A FOUNDRY? SURE!

(*Continued from page* 115)

'oundry has *it*—in the best meaning o hat often misused and bad'y cast word

"Founding is an ancient art envelope 'n a wealth of human tradition," Lar said recently in describing operations a he Major corporation. "It holds plen 'f room for the artist as well as for th cientist and businessman.

"I began by putting $12,000 in th 'uente plant after a friend told me o 's possibilities during the early days o he war. Later, I tapped Bing for $2,000. Since then we've increased our holding as has our foundry manager, A. J Leonard.

"Bing is glad he came in. Once I asked 'im if he wanted his money back. That vas when we were just beginning to ge 'nto production. He said 'Never!' That neans he's in the foundry game for keeps, as we all are."

With the good-natured insouciance hat has become a hall-mark of the Crosby clan, Larry gave a sketch of the 'oncern's development.

Most of its war work was on subcon 'racts for the Army and Navy, principally 'ircraft parts for North American Avia 'ion Corp. Backing Mr. Leonard's passion for perfection, the management has ta 'ken a rigid stand on loose foundry prac 'ices dating from before the war, an 'ttitude 'sometimes expressed in the slogan, "to hell with specifications. Pour 'em!"

Larry Crosby feels strongly on this phase of founding. The days of haphazard procedures are over he believes, and in foundries everywhere the day of the scientist has dawned. This view may be the attitude of a newcomer to the busi ness, he admits, that of the amateur who refuses to take for granted what the veteran has come to accept—but he and they at Puente mean it.

When a casting is made there, Mr Crosby declares, it has to conform to all the rules and regulations as specified, re

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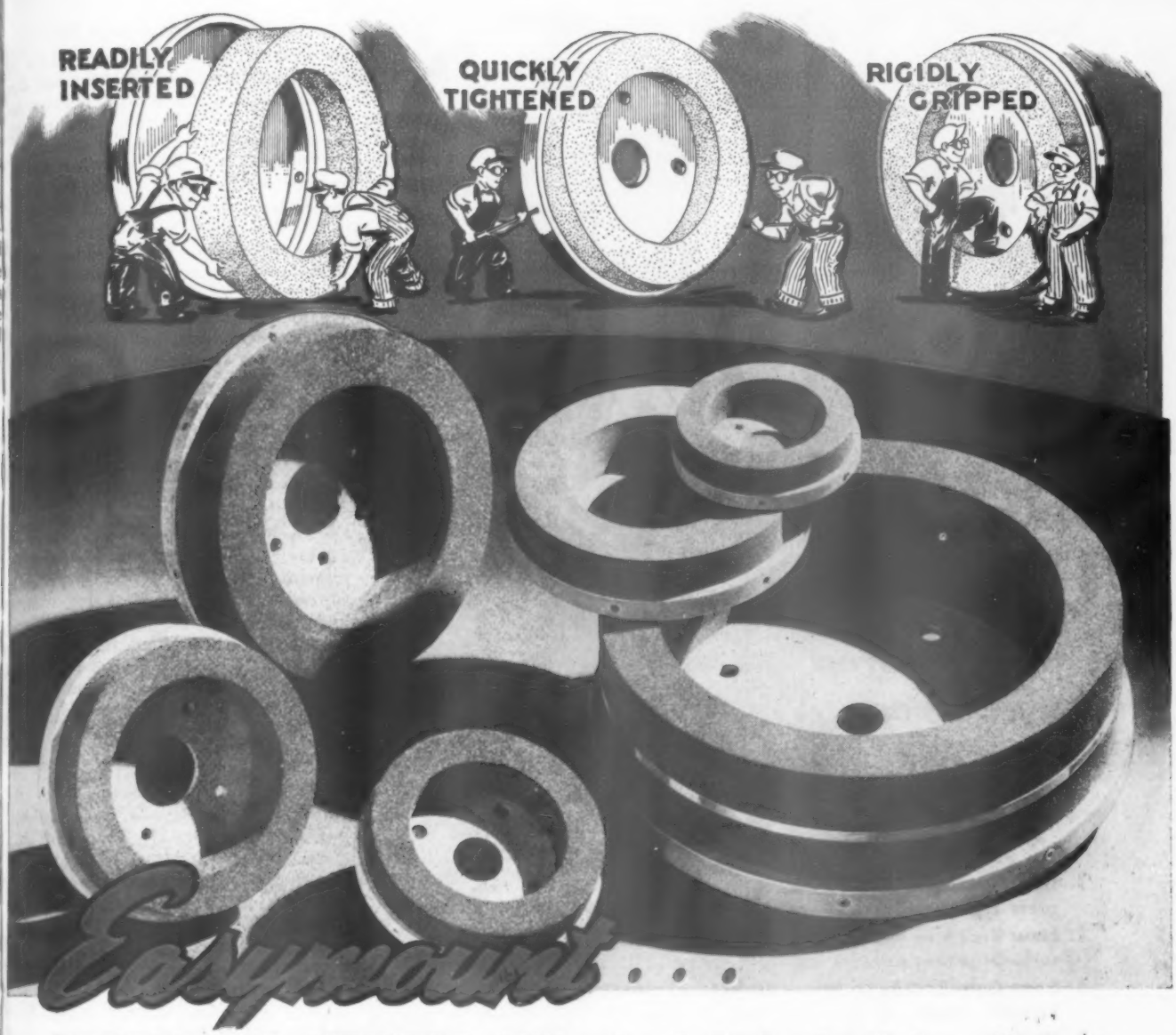


STERLING'S NEWEST "Wheel of Industry" for Expert Grinding of Steel and Tungsten Carbide Tools . . . .

New enough to offer unusual advantages . . . on the market long enough to be thoroughly tested—these are the reasons for the rapidly growing popularity of Sterling's Easymounts and Wheels for quick, easy grinding of tool steels and tungsten carbide.

The Sterling Grinding Wheel is readily placed in the Easymount and firmly retained there by an unusual assembly which does not permit the tightened screws to touch the abrasive surface.

Send for this recently issued Easymount folder . . . it's free!

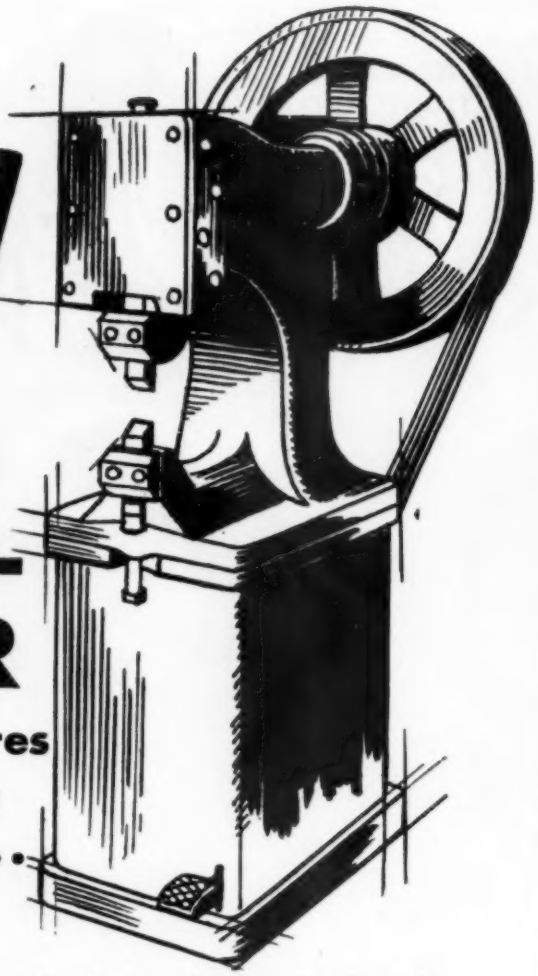
Easymounts are purchased once . . . wheels can be replaced from stock as needed—an economical, sure-fire renewal method that keeps your machines producing all the time.

Thousands of Easymounts and Wheels of all sizes are in use . . . every one doing a better, faster, easier controlled job of grinding. They will fit admirably into your schedules, too. May we tell you more about them?

• STERLING ABRASIVES •

THE STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY



NEW

TESSMER
SPRUE-
CUTTER

Has the Features
You've Been
Waiting For . . .

1. **Improved Clutch** — Simple, rugged, conventional punch-press type, designed for continuous, trouble-free service.
2. **New Brake** — One-piece flexible-band style. Larger braking surface assures positive, accurate control.
3. **Rear Cam Rod Bearings** — Enclosed in separate, removable bracket. Makes all clutch parts easily accessible.
4. **Knife Caps** — Steel tapered end type with no protruding nuts. No danger of pinching operator's fingers; provides work-piece freedom.
5. **Alemite Lubrication** — Makes it easy to lubricate all moving parts.
6. **Foot Pedals** — Placed at right side of base . . . enable operator to work with natural movements, in normal position.
7. **Massive Steel Base** — Results in less weight with greater strength and rigidity.
8. **V-Belt Drive** — If motor is mounted in base.
9. **Shelving in Base** — For storage of tools and equipment — if machine is not motor driven.

These features mean higher postwar standards of performance, workmanship and service for the famous Tessmer Sprue-Cutter — a top favorite in the cleaning departments of non-ferrous foundries for many years. Available *NOW*. Write for particulars.

Milwaukee
GRAPLET AND MANUFACTURING CO.
1025 S. 40th STREET • MILWAUKEE 4, WIS.

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(*Concluded from page* 188)

gardless of individual preferences or prejudices formed in the heat and dust of hit-or-miss methods many founders got used to in the old days before military inspectors appeared on the scene.

"Even, as can happen, when the inspector doesn't know his job, the foundryman has got to know his all the better.

"In the future, we believe that precision apparatus for checking sands, mixes, metallurgical consistencies and all other phases of casting operation will be regarded as necessary as flasks.

"Better products, better service—such are and will remain the keys to successful running of a foundry business."

The Major corporation at its peak of production was delivering 40,000 lb of castings a month. Its force was between 300 and 350, but this has dropped to around 50, reflecting recent cutbacks.

With the slow growth of reconversion, the Puente plant is certain to grow apace, in the opinion of its owners. A cast aluminum skillet with satin finish and bakelite handle, sump pumps for wineries and other installations, nonclogging pumps for washing machines, recently invented—these are a few of the articles that will come off production lines at Puente in the peacetime period now at hand.

Foundation Is Clearing House

The foundry's connection with the Crosby Research Foundation is incidental rather than direct. The foundation is a clearing house for ideas of inventors and a developer of such ideas as are deemed sound. It is an organization of Crosby brains and Crosby capital, however, so that its researches supplement but do not dominate those of the Major Aircraft Foundry Corp.

Of the many ideas already melted down and refined to the manufacturing stage by Foundation technicians, some will contain castings in whole or part. Others will require different methods and materials than those of foundries.

Yet both Major Aircraft Foundry Corp. and Crosby Research Foundation reflect, in truth, one quality in common. That quality is glamour—again in the best sense of the word, sans sex appeal, sans lipstick (though not rouge and dye in the proper places), a quality reflected, as Mr. Crosby says, in the old and honorable tradition of founding that began the day a primordial savage first threw a "rock" of iron ore into a hot bed of charcoal upon an ancient limestone ledge to beget a new race of men.

Veteran Employees Receive Awards

Peace Foundry Co. Ltd., Toronto and Brampton, Ont., on their 60th anniversary presented gold watches to 7 employees of the Toronto plant and to 11 members of the Brampton shops, who have 25 years or more of service. President Allan Case and Vice President R. V. Millar presided at the ceremony.

MASTER POWER PNEUMATIC TOOLS

Hard Chrome Plated for Longer Service Life

RAMMERS

GRINDERS

DIE GRINDERS

HAMMERS

VERTICAL GRINDERS

The "MASTER" family is a good one for every foundry operator to know—even though every member in it is a tough individual.

Chipping hammers, rammers, rotary grinders—each is built to "MASTER" standards with all parts subjected to wear precision ground and Hard Chromed.

If you are interested in long-lasting pneumatic tools—tools that will turn out more work—tools that require less than average maintenance—tools that you can get quickly if you need them—specify "MASTER."

REBUILDING OF ALL PNEUMATIC TOOLS TO "MASTER" STANDARDS

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Pattern Shop & Foundry Supplies & Equipment

Mahogany and Pine Pattern Lumber

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SOME "FALLS BRAND" COPPER ALLOYS

Copper Aluminum 20/80
Copper Aluminum 40/60
Copper Aluminum 50/50
Copper Calcium 90/10
Copper Chromium 95/5
Copper Iron 70/30
Copper Iron 90/10
Copper Iron 95/5
Copper Magnesium 90/10
Copper Nickel Aluminum 25/25/50
Copper Nickel Shot 50/50
Copper Nickel Shot 70/30
Copper Nickel 85/15
Copper Phosphor 85/15
Copper Phosphor 90/10
Copper Shot
Copper Silicon Aluminum 25/25/50
Copper Silicon 70/30
Copper Silicon 80/20
Copper Silicon 85/15
Copper Silicon 90/10

This partial list is but a few of the many alloys we make. Each is for the specific purpose of adding quantities of high melting point metals to standard alloys.

There's a Falls Brand Alloy For Every Foundry Use.

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NIAGARA FALLS SMELTING & REFINING CORPORATION
America's Largest Producers of Alloys
BUFFALO 17, NEW YORK

PHYSICAL TESTING OF CORE BINDERS

(*Continued from page* 91)

mixtures, and 15 to 30 times for more complicated mixtures. The object in most cases is to ram the core sand mixture to maximum density.

Testing the Cores: After the test cores have oxidized their predetermined length of time in the oven, they should be removed and be allowed to stand in the air for five minutes before rapping the core plate. If rapped before this, stresses in the cores will result which will cause variable test results.

As soon as the cores are removed from their core plates, they should be placed in a desiccator. This is very important, especially when the relative humidity of the atmosphere is high. After the cores are cooled to room temperature, tensile strength cores are removed and tested. It should be pointed out that enough cores should have been prepared so that all tests can be performed.

After the cores have cooled to room temperature in the desiccator, some of them are removed and placed in an oven and reheated to 250 F. It usually takes two hours for this operation. These cores are then removed one at a time and quickly tested for their strength at 250 F. This test measures the hot strength of the core and is helpful in controlling breakage of cores while handling in the core room, especially if the cores are handled while hot. Usually, the core's strength at 250 F is at least 50 per cent of its strength at room temperature. If not, the core loss in the core room will be exceedingly high.

Amount of Gas in Core Binder: Two to five gram samples of the baked and broken tensile strength test cores which were tested at room temperature are taken for the gas test. A carbon combustion furnace is used on this test and is operated at 1850 F. The sample is inserted in the furnace and the amount of gas evolved from the gas can be either collected over water, or measured in pressure on a mercury gauge and converted into the amount of gas evolved.

Usually, if a core binder gives off more than 350 cc from a 5 g sample, it is said to be unusable because it has a gas content which is too high.

Loss in Strength Due to Moisture Absorption: In order to perform this test a suitable oven must be procured. It does not have to be able to produce any given temperature and usually is a discarded oven. The principal variables that should be controlled in this test are the temperature of the oven. It should be about 80 F, and a novel method has been worked out by Mr. Austin of the Buick Motor Division to accomplish this. A pan of water is placed on the bottom shelf of the oven. The pan is 8 x 8 x 2 in. in dimension. It is three-fourths

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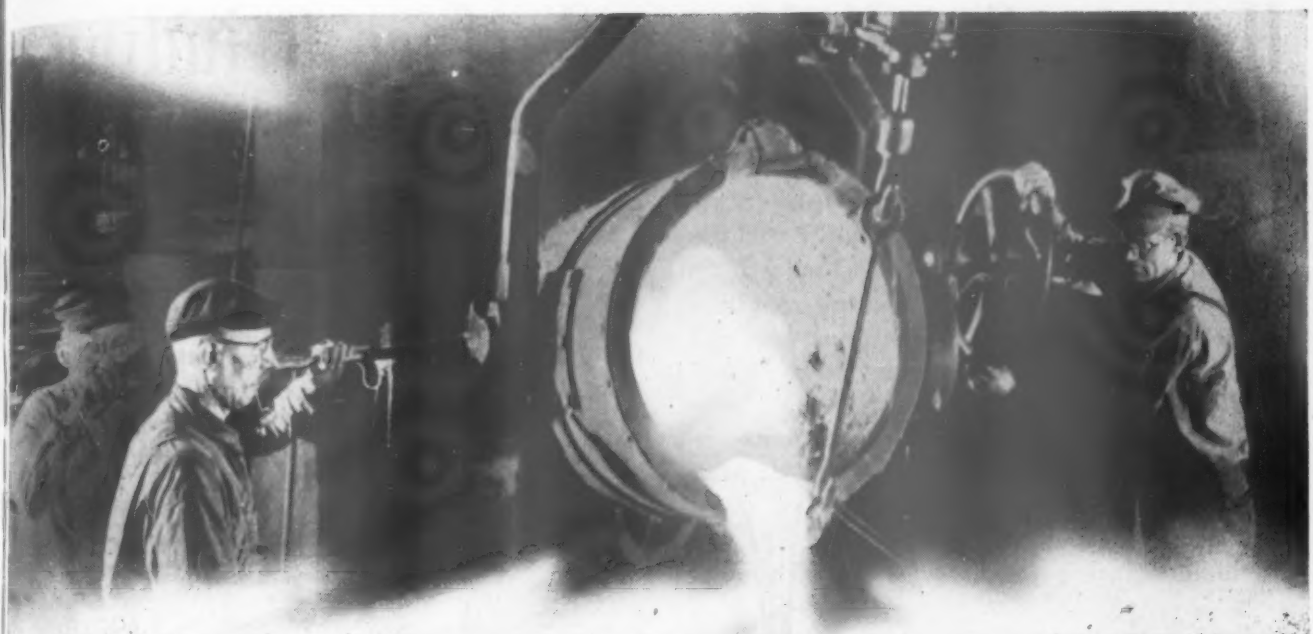
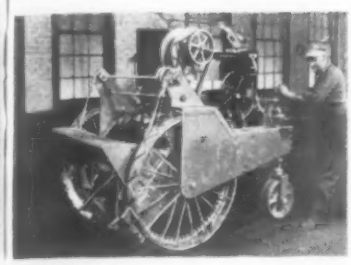


HOW MUCH *Scrap* IS HE POURING?



MODEL AM Sandcutter is the newest and smallest Sandcutter. It is recommended for use on light to medium floors.

MODEL K Sandcutter is the largest Sandcutter in the American Line. It embodies the maximum in capacity and rugged endurance.

F THE condition of the molding sand isn't right, you can be sure that a relatively high percentage of castings will be defective.

For perfect molds, foundry sand must be thoroughly conditioned and of the right texture. It's pretty difficult to get it into this condition when hand cutting methods are employed, for a man with a shovel cuts through a square foot of sand only six times at the maximum. But with an American Sandcutter—whose blades slice through the same square foot at least 100 times—you can rest assured that your sand reaches the molders completely and perfectly conditioned.

Dry spots, wet spots, and lumps are eliminated; bond and moisture are thoroughly distributed. With sand conditioned this way scabs, blow holes, run-outs, and other casting defects are reduced to the minimum. And a Sandcutter saves money for you in other ways, too, for it does the work in only a fraction of the time hand-cutting methods require.

Nearly 2,000 foundry users have found that an American Sandcutter is essential to efficient operation. Applied to your sand conditioning it will afford equal advantages—write today for full particulars.

American Sandcutter

FOUNDRY EQUIPMENT CO.

505 S. BYRKIT STREET, MISHAWAKA, INDIANA

How to Get Uniform Surface Grinding

WITH THE SAME SEGMENT SPECIFICATIONS MONTH AFTER MONTH

"Fractional Grading"... the exclusive Bay State feature that makes it *easier* for you to select the Bay State Segment Specifications that will remove the right amount of metal in the least time at the lowest abrasive cost . . . also assures you that those specifications will be *more closely duplicated* on repeat orders.

That's because only Bay State Segments are made in *three degrees of hardness within each usual grade.*

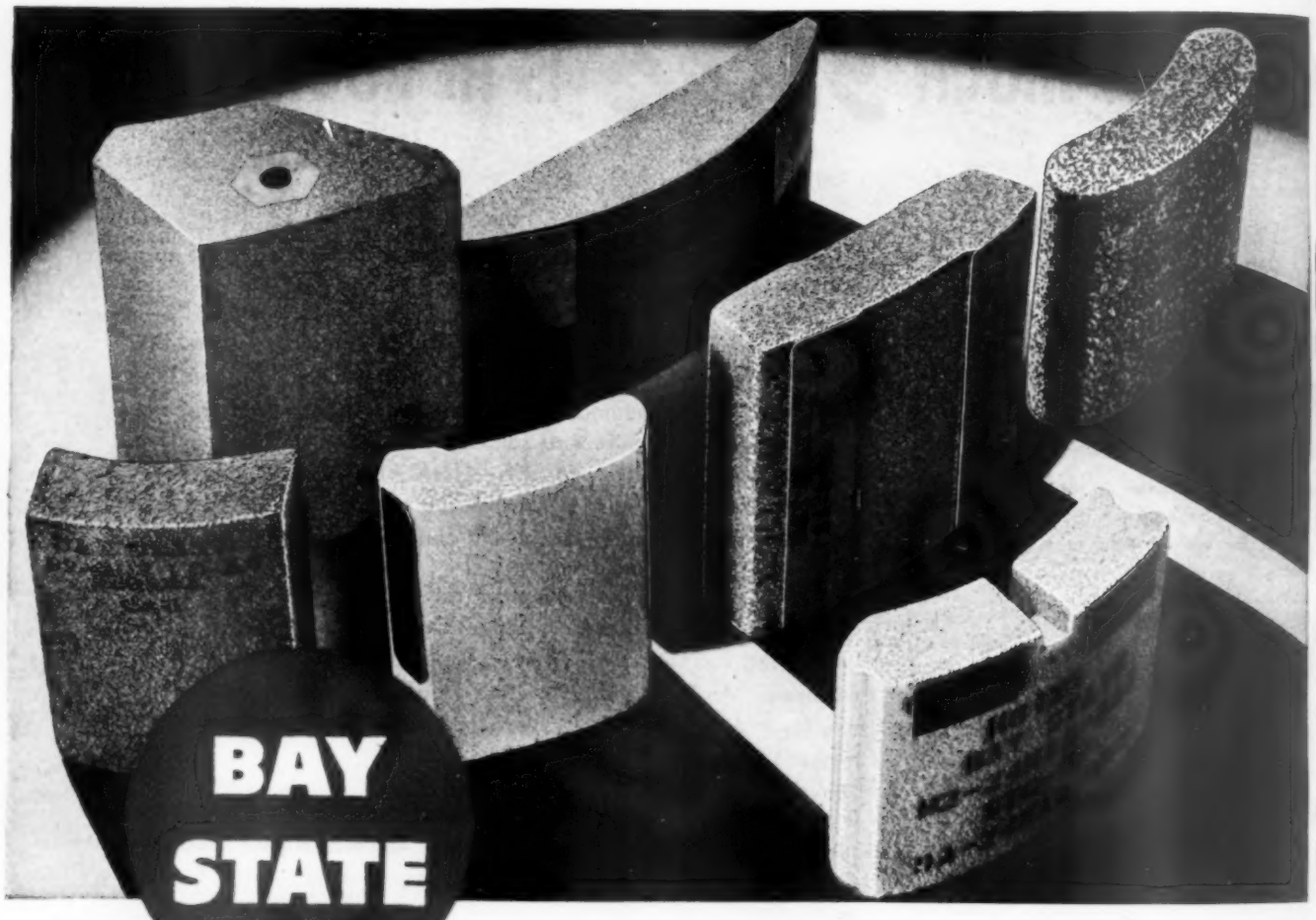
Such precise control of hardness is achieved by manufacturing processes that also control porosity and give bonds extra holding power.

WHEN TO SPECIFY KOOLPORE

On surface grinding jobs that can use segments with extra wide open pores, you'll find Bay State's KOOLPORE processed segments give you faster, cooler cutting... more efficient production.

For more facts about the ability of Bay State Segments to give *top performance consistently duplicated,* write for literature... today.

BAY STATE ABRASIVE PRODUCTS CO.
7 Union Street, Westboro, Mass.



ABRASIVE PRODUCTS

Top Performance Consistently Duplicated

GRINDING WHEELS · HONING AND SUPERFINISHING STONES · PORTABLE SNAGGING WHEELS
MOUNTED WHEELS AND POINTS · CUT-OFF WHEELS · INSERTED-NUT DISCS AND CYLINDERS

(*Continued from page* 192)

filled with water, and a 5-watt, red painted, electric light bulb is inserted in the water in one of the corners of the pan closest to the back of the oven. This method keeps the oven at 80 F the year around.

Cooled cores from the desiccator are placed in the oven on a wire shelf and are exposed to the relative high humidity of the air for 10 to 12 hours or overnight. They are tested as usual in the testing machine. If a core loses more than 50 per cent of its strength at room temperature, the core oil is said to be too hydroscopic for ordinary foundry practice.

Other Considerations: It can readily be pointed out that the foregoing method does not tell the corereom foreman certain information of a practical nature. For instance, the tests as outlined do not show the core room foreman whether the core binder will blow cores successfully on the core blowing machine.

The tests will not show the practical man if the core oil sticks in the core boxes. These practical considerations are very important, so most plants determine if the core binder will pass the laboratory tests first; and then order several drums of core oil under consideration and run a practical test in the foundry before placing a core binder on the so-called approved list.

Buy on Competitive Basis

Once a core oil is on the approved list, the purchasing department can then place inquiries to the core oil companies involved, and buy core oils on a competitive basis. Of course, the purchasing department and laboratory reserve the right to reject any core binder that does not meet the physical tests on each shipment of core oil made.

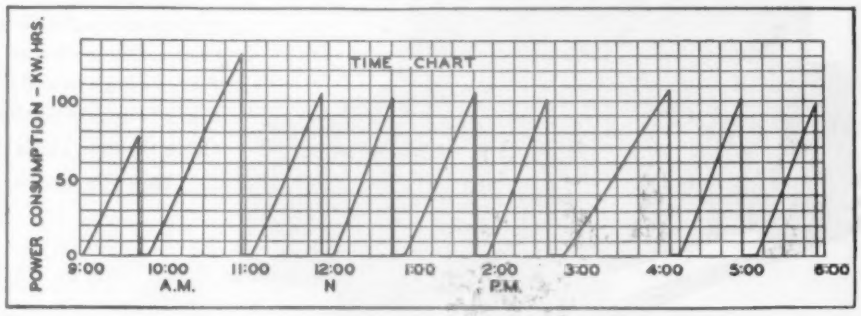
It can also be pointed out that if due care is taken in performing the herein described tests that uniform test data result. Tensile strength tests at room temperature need not be affected by the humidity of the atmosphere, and each test core should check within 10 psi. The amount of gas evolved from the baked core and mixture should check as close as 1 cc., and all other tests should check within 10 psi. Of course, operators do make mistakes, and once in a while faulty test cores are produced. These are easily recognized and results may be discarded.

If this method of testing core binding materials is followed both by the producer and the user of these materials, a more effective method of testing cores results than when chemical tests are employed. It permits the producer to use many of the newer binding materials, of which petroleum polymers can be named as an example. Petroleum polymers are low in saponifiable content which would prevent their usage in core binding materials if chemical tests were used to test cores. The war has taught many foundrymen that the use of petroleum polymers sometimes does a good job in the coreroom where conventional core binding

(*Concluded on page* 199)

DAILY OPERATING RECORD OF SMALL DETROIT ELECTRIC FURNACE MELTING GREY IRON

DAILY GRAPHIC OPERATING RECORD, TYPE LFC, 350 LB. DETROIT ROCKING ELECTRIC FURNACE, MELTING HIGH QUALITY GREY IRON FOR CYLINDER LINERS.



SUMMARY: HOURS OPERATION 9; NO. HEATS, 8; WT. PER HEAT, 375 LBS.; TOTAL METAL MELTED, 3000 LBS.; KWH TOTAL, 931; KWH PER TON, 620.

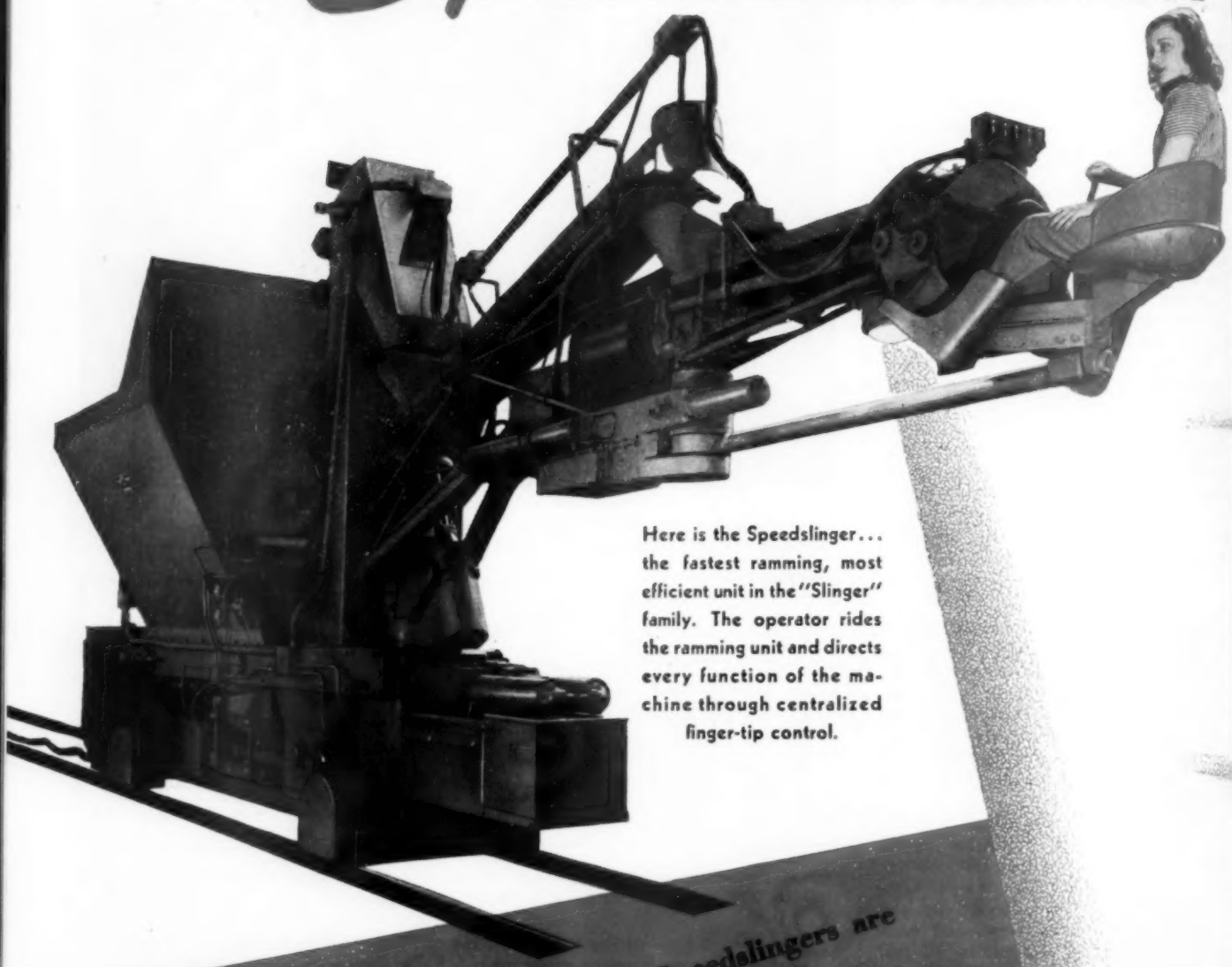
Let's take a look at the facts from the daily operating record of a Detroit Rocking Electric Furnace covering a 9-hour working day.

Making high quality grey iron for cylinder liners, from borings, scrap and ferro-alloys, a Type LFC, 350 lb. Detroit Rocking Electric Furnace poured 8 heats in the 9-hour period, each heat weighing 375 lbs., for an output of 3000 lbs. Melting time per heat was 49 minutes; elapsed time per heat, (after the first heat which included preheat period), was 56 minutes. Because the design of Detroit Furnaces permits close control over time, temperature, composition, and other vital melting factors, an engineering product of superior wear resistance is produced. And cost? Consider the low priced raw materials used—consider the quality of the product—and only 620 Kw. hrs. per ton!

Records like this are incontrovertible evidence that Detroit Electric Furnaces are fast melting, economical, efficient. They are your assurance that Detroit Electric Furnaces, installed in your own foundry, will do a faster, more versatile job of melting ferrous and non-ferrous metals. Write for further facts.

DETROIT ELECTRIC FURNACE DIVISION
KUHLMAN ELECTRIC COMPANY • BAY CITY, MICHIGAN

SEE THE "Speedslinger" IN ACTION

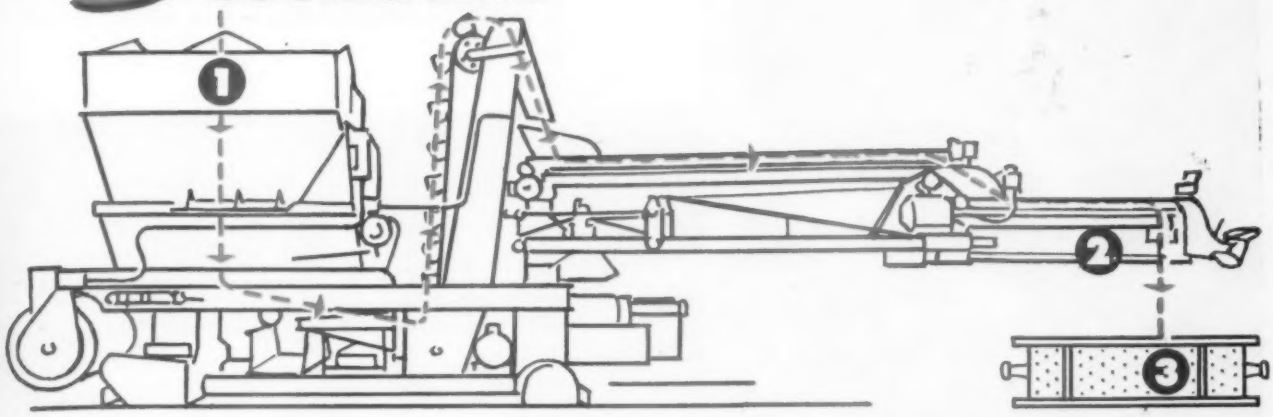


Here is the Speedslinger... the fastest ramming, most efficient unit in the "Slinger" family. The operator rides the ramming unit and directs every function of the machine through centralized finger-tip control.

See the Speedslinger in action! Speedslingers are in operation in foundries throughout the country... a B & P representative can easily arrange to have you see one of these mechanized ramming machines in a foundry in your locality. Write us today, we will make an appointment for you to make the visit at your convenience!

The Speedslinger... For Faster, More Uniform Ramming!

Sand...



...FROM SPEEDSLINGER HOPPER INTO FLASK!

1

The Speedslinger requires no elaborate or expensive sand handling system and carries its own sand to the job in the kind and quantity needed. The entire machine works up and down the foundry on a track, ramming molds on either side for the full length of the track.

2

This long arm can swing out and ram molds on either side of the Speedslinger within a range of 22 ft. and up to a height of 9 ft., ramming them at the rate of over a ton per minute. Even an inexperienced operator can easily handle the functions of the entire machine.

3

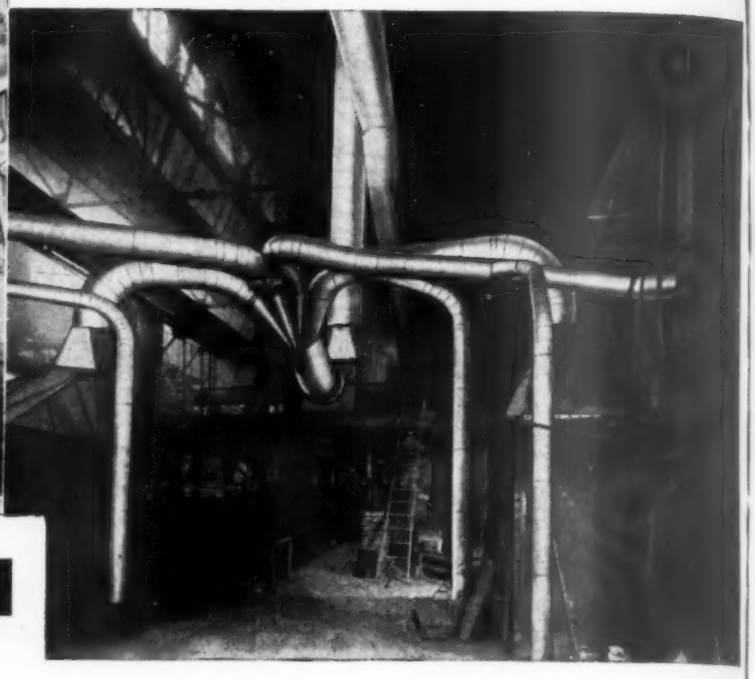
The Speedslinger rams molds of all sizes and shapes hard and uniformly. For medium and large jobbing work, it will deliver and ram 60 tons per hour at an average cost of .003 cents per cu. ft. as compared to .08 cents per cu. ft. for hand filling and air ramming, or a ratio of 27 to 1 in favor of the Speedslinger!

Write today for booklet giving engineering data and specifications on the Speedslinger.

THE BEARDSLEY & PIPER CO.

2540 North Keeler Avenue — Chicago 39, Illinois

THE BEARDSLEY & PIPER COMPANY ARE MANUFACTURERS OF
SANDSLINGERS • SPEEDSLINGERS • SPEEDMULLORS
SCREENARATORS • MULBAROS • SHAKE-OUTS
SAND CONDITIONING MACHINES • GYRATORY SCREENS



Two views of Dust Control System installed at G.H.R. Foundry Division of Dayton Malleable Iron Co. Air volume handled is approximately 103,000 CFM.

PRODUCTION CONTINUED

As Kirk & Blum Engineers Install Complete DUST CONTROL System

No interference with foundry production! This was among the major problems that had to be solved by Kirk & Blum "Air Engineers" in the installation of a complete, efficient, custom-built Dust Control System at G. H. R. Foundry Division of Dayton Malleable Iron Company, Dayton, Ohio.

The entire system was planned and designed to meet the requirements of this particular job—then erection was carefully scheduled and the entire installation made while *foundry production continued uninterrupted.*

G. H. R. is a small parts, high production foundry, and each unit of the dust control system had to be located so as to avoid interference with conveyors and other mechanical handling equipment.

***Modernize now*—with K & B Dust Control. Protect your workers' health, increase their efficiency, step up the quality and quantity of your production. Call on Kirk & Blum Engineers—backed by 38 years' experience in this specialized field. Write now for full information.**

SEND FOR BOOKLETS:

"Dust Collecting Systems in Metal Industries"
"Fan Systems for Various Industries"
"Blower Systems for Woodworking Plants"
"Industrial Ovens"
"Cooling Systems for the Glass Industry"
"Data on Kirk & Blum Production Facilities"

KIRK AND BLUM

The KIRK and BLUM MFG. CO. 2808 Spring Grove Ave. Cincinnati 25, Ohio

(*Concluded from page* 195)

materials were a prewar necessity. This was especially true in the aluminum industry during the war when complicated cylinder heads and other castings were produced for the aviation industry.

Another result of physical testing of core binders is that it encourages the development of new binding materials because it eliminates the idea that only drying oils, rosin, and kerosene should be used by core binding manufacturers and that unless these are used, the core binding material is not usable in the foundry. All this tends to result in stimulated research, thus resulting in improved low cost, core binding materials.

COLLECTORS ON CUPOLAS CLEAN WASTE GASES

(*Continued from page* 90)

through a solenoid valve which locks out electrical controls of the cupola blower system unless water is flowing to the dust collector, thus giving assurance that dust collectors will be operating as long as blowers are functioning. Water flows from each of the 38 spray nozzles in the collector ring at a rate of around 2 gpm.

A quick calculation shows the cupola stack with 7-ft inside diameter to have an area of 38.5 sq ft, while the outer 14-ft shell would have area of 154 sq ft. Subtracting from the latter the area of the conical canopy which is 63 sq ft leaves 91 sq ft for the area of the annular open space between the canopy and the shell. This is roughly 2.35 times the stack area which would indicate a slowing down of the velocity of emerging gases by more than one-half. In addition to their reduced velocity, waste gases are cooled appreciably by the water sprays, thereby somewhat reducing their volume and tending actually to increase the draft on the stack.

For inspection and servicing of the collector units, a walkway with subway grating floor has been erected the entire length of the six cupolas. Floor level is about 2 ft below the top edges of the collector shells, and a steel railing along the outer side is installed as a safety measure. Access to the walkway is by means of a ladder, with hand railing, from the roof of the cupola building, opposite No. 1 cupola. Lateral drainage trough has an open top and may be serviced from the roof.

As a measure of the effectiveness of the dust arresters, tests were conducted on one cupola melting charges containing briquets which would be productive of more dust than a charge of pig iron and heavy scrap. Separation of solid matter from the water flowing into the sludge tank showed 12 lb per minute, 60 per cent of which was magnetic material. Without the arresters, this dirt would be

8 Screenarators

"DO WONDERFUL JOB"

FOR CHICAGO HARDWARE FOUNDRY CO.

• John H. Fienning, Superintendent of the Chicago Hardware Foundry Co., North Chicago, Ill. says: "Our eight Screenarators are doing a *wonderful job* in preparing our sands and are labor-saving at a very moderate up-keep."

• Dozens of job shops and production foundries all over the country tell us the same story . . . how thoroughly the Screenarator cleans, cuts, screens, double-areates and blends sand . . . how this versatile, low cost sand conditioner produces more flowable, more rammable sand that assures smoother finished castings . . . how it saves both time and labor. See for yourself how the Screenarator conditions sand the *way* you want it, *where* you want it! Write for complete information today.

THE BEARDSLEY & PIPER COMPANY

2541 North Keeler Avenue Chicago 39, Illinois

Manufacturers of Speedslingers, Speedmullers, Sandslingers, Screenarators, Mulbaros, Shake-Outs, Sand Conditioning Machines

FULLER ROTARY COMPRESSORS

Four Fuller Rotary Two-stage Compressors, each having a capacity of 1665 c.f.m., 100-lb. pressure.

In A Steel Mill

Hundreds of Fuller Rotary Compressors are in service in the metal industries, working 24 hours a day, day after day, month in and month out, with low maintenance expense . . . that's why plant superintendents and maintenance men like them. There's a very good reason for this excellent performance because Fullers have very few moving parts to wear or adjust. Another very important feature always to be considered . . . *due to their design Fuller Rotaries will maintain their original capacity for the life of the machine.*

Fullers are built for capacities to 1800 c.f.m., pressures to 100-lb. Write for Bulletin C-5 illustrating and describing these machines.

Bulletin C-5
It's yours for the asking

FULLER COMPANY
CATASAUQUA, PENNSYLVANIA

Chicago 3 · 1144 Marquette Bldg.
San Francisco 4 · 421 Chancery Bldg.
Washington 5, D. C. · 618 Colorado Bldg.

C-121

FULLER
PIONEERS OF HIGH-EFFICIENCY ROTARY COMPRESSORS

blown into the atmosphere.

Just beyond the cupolas is a raw materials storage yard, with open bins for pig iron, scrap, coke, limestone, etc., all of which formerly was quickly contaminated and coated with dirt and dust from the cupolas. This was a serious matter economically, for pig iron often had ¾-in. of oxide deposited on it and allowance for extra coke had to be made in the charge, just because of this coating. Furthermore, roofs and window sash of adjoining buildings were quickly coated with iron oxide and required frequent cleaning and maintenance, sash often being actually eaten out by the deposit.

Nearby residential homes were the recipients of a rain of iron oxide when the wind was in the right direction, which led to repeated complaints. The arresters have silenced these objections. Some years ago, parked automobiles in the immediate vicinity were marred so seriously by cupola dirt that all had to be repainted. Frequent roof fires from incandescent material falling from waste cupola gases were experienced; these are now a thing of the past. Beyond this, the installation of arresters has dispensed with the need for maintenance men formerly required to clean the building roof, plus work on the ground below to handle refuse, as well as trucking.

The installation is estimated to have cost under $8500 each and thus should pay for itself many times over in a few years. Costs of operation and servicing are negligible. All metal sections of the arresters are painted inside and out with a high-temperature heat and acid resisting paint which should show little deterioration because of the comparatively low temperatures involved.

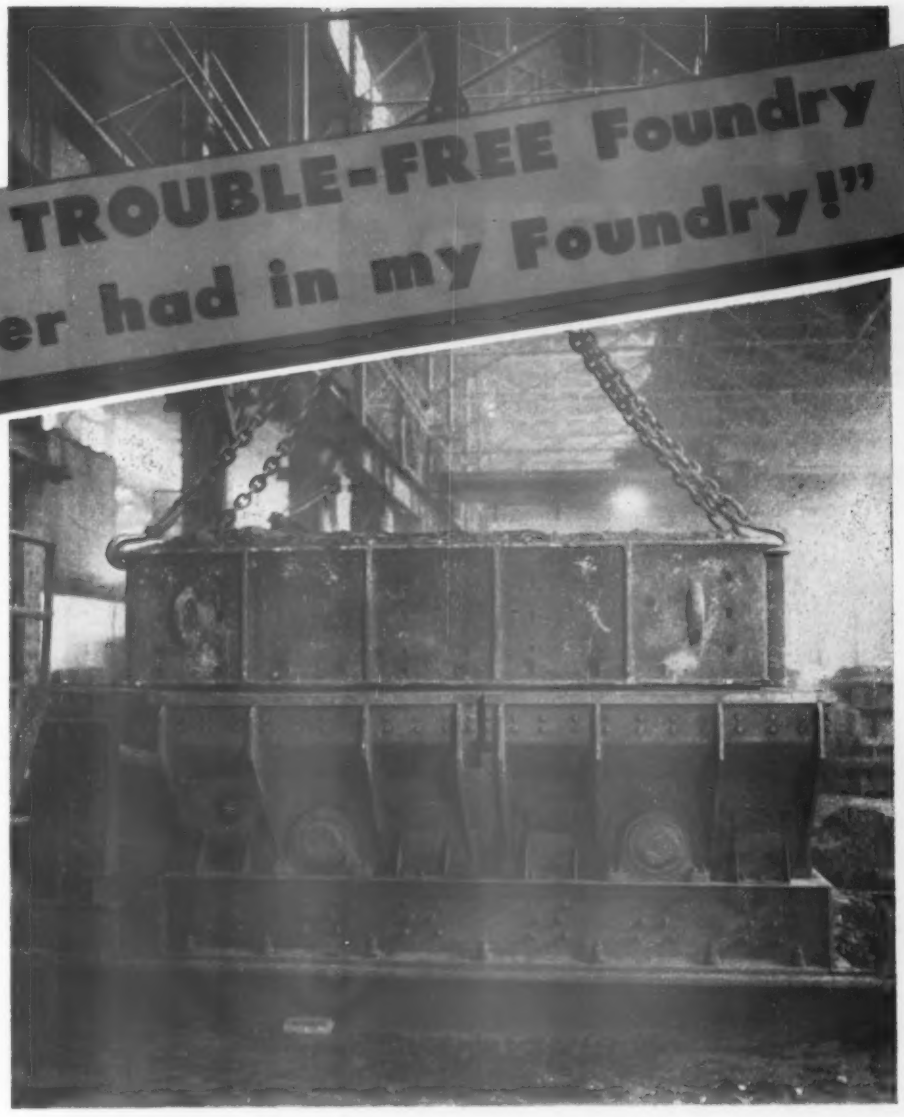
The Buick cupola stacks are somewhat higher than those of the average gray iron foundry, and it is not known for certain whether a similar type of dust arrester would work as satisfactorily on a lower stack. However, there is complete satisfaction with the operation of this installation.

Acquires Fort Pitt Steel Casting Co.

Pittsburgh Steel Foundry Corp., Glassport, Pa., has purchased the plant and equipment of Fort Pitt Steel Casting Co., McKeesport, Pa., and will operate the latter as Fort Pitt Division of Pittsburgh Steel Foundry Corp. T. F. Dorsey, former sales manager of Fort Pitt and more recently assistant sales manager of Pittsburgh Steel, has been named general manager of the new division.

Fort Pitt Division will continue to operate as an electric steel foundry, specializing in production of small carbon and alloy steel castings, while the Glassport plant, which makes large open-hearth steel castings, will now have the flexibility in melting equipment that is required for small orders. All departments except cleaning and finishing at the Fort Pitt plant started production Oct. 1 under the new management.

"The most TROUBLE-FREE Foundry Unit I ever had in my Foundry!"



MEMBER
MANUFACTURERS' ASSOCIATION INC. FOUNDRY EQUIPMENT

This is a direct quotation from a statement made by the General Superintendent of a large Eastern steel foundry. A SIMPLICITY 8′ x 10′ Dual Shake-Out, such as illustrated by the cut, is the machine covered by the quotation. The 8′ x 10′ Dual Shake-Out was installed in this steel foundry in 1942 and has been in active service since that time. The first SIMPLICITY Gyrating Shake-Out was installed in a malleable iron production foundry in March 1933. Since that time 53 different sizes and models of shake-outs have been built to meet customers' requirements. Today, SIMPLICITY Shake-Outs are operating in 310 gray iron foundries, 188 steel foundries, 130 non-ferrous foundries and 40 malleable iron foundries. The SIMPLICITY Gyrating Shake-Out filled the urgent need for a high speed, efficient flask shake-out and casting knock-out unit. These points were bottlenecks in nearly every operation, before the SIMPLICITY units were installed.

Simplicity
TRADE MARK REGISTERED

ENGINEERING COMPANY
DURAND, MICHIGAN

HAUSFELD FURNACES

FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.
300-320 MOORE ST. HARRISON, OHIO

Industry BRIEFS

CONTROL of Kensington Steel Co., Chicago, has been acquired by Poor & Co., that city. The latter has owned a substantial stock interest in the Kensington company for many years. A producer of manganese and alloy steel castings since 1896, Kensington will continue under the same management, including Eugene C. Bauer, president, Kenneth Jensen, vice president, R. W. Sergeant, secretary-treasurer, and E. C. Anderson, sales manager.

• • •

Acme Aluminum Alloys Inc., Dayton, O., has purchased the Wm. F. Jobbins Co., Aurora, Ill., ingot metal producer. The latter will operate as a division of the Acme company, with Karl Stein as president. William McKnight remains at Jobbins as secretary, treasurer and general manager.

• • •

Food Machinery Corp. has acquired the assets and business formerly owned by Mechanical Foundries Inc., Vernon, Calif. The new subsidiary will be known as Mechanical Foundries Co. Fred C. Edmison, identified with operation of Mechanical Foundries for the last 25 years, has been made president and general manager of the new subsidiary.

• • •

Roots-Connersville Blower Corp. has made extensive improvements to its offices at the Connersville, Ind., plant. An addition to house the engineering department provides six additional offices, a conference room and a drafting room 15 x 55 ft.

• • •

Redford Iron & Equipment Co., 21315 West McNichols Rd., Detroit, has moved into its new plant which comprises an enlarged machine and welding shop for the production of a new line of bench core blowers.

• • •

Van Komen's Brass & Bronze Foundry is the firm name under which Harry Van Komen and Stella Booth have published a certificate that they are conducting business at 9850 Adella Ave., South Gate, Calif.

• • •

Walker-Turner Co. Inc., Plainfield, N. J., manufacturer of metalworking and woodworking tools, plans additions to its two plants involving 200,000 sq ft of floor space.

• • •

Queenco, Inc., Cincinnati, has been incorporated by Robert A. Schimpff, Irwin C. Schneller and Gilmer W. Penick to do general foundry work.

• • •

General Bronze Corp., Long Island City, N. Y., was one of 50 corporations to receive awards recently from the *Financial World* in a competition to de-

(*Concluded on page 204*)

REDUCE LADLE LINING COSTS *with* HELSPOT

HELSPOT

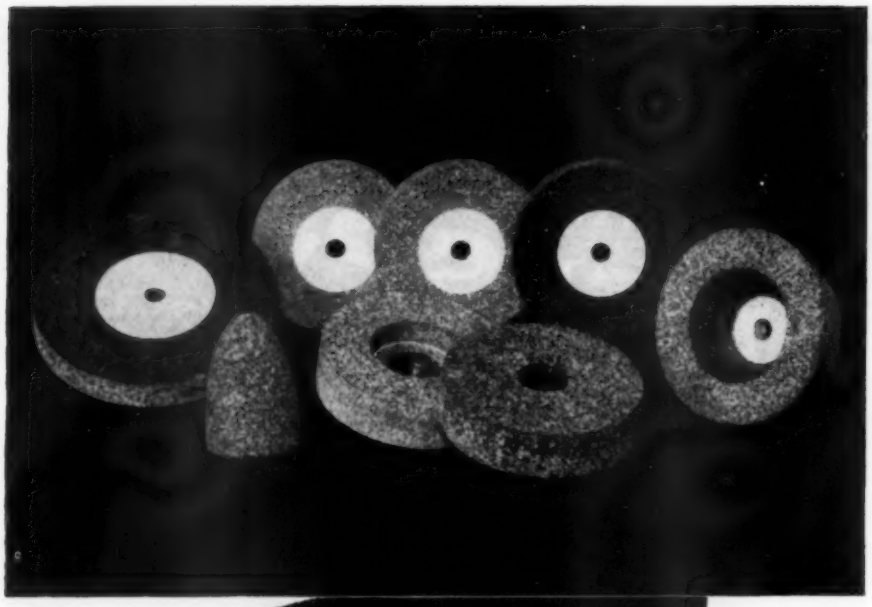
Slag Resisting Monolithic Lining for Metallurgical Ladles and Furnaces

HELSPOT—"tried and proven" super quality plastic firebrick—will reduce ladle lining costs, improve pouring operations and minimize metal contamination. Highly refractory graphite, chemically sealed into the mix, gives HELSPOT lining a smooth, "self-lubricated" surface which permits easy metal flow and prohibits metal penetration. The formation of skulls is practically eliminated in HELSPOT-lined ladles. Slags do not build up on the slick graphite surface; less time is required for cleaning, repairing or relining ladles.

A Super-Duty Fire Clay base assures maximum resistance to spalling and cracking. HELSPOT lining will withstand the most severe thermal shock. HELSPOT comes, ready to install, in 100-lb. cartons and 500-lb. drums.

HELSPOT
LADLE WASH
A finely ground material with a graphite base, recommended as a final coat for any ladle lining. It seals drying - in cracks, replaces surface loss through oxidation, produces a smooth, even lining surface. In 100-lb. bags, add only water, mix; easily applied with brush.

MEXICO REFRACTORIES COMPANY
MEXICO, MISSOURI
Affiliate: NATIONAL REFRACTORIES COMPANY — 1720 Locust Street — PHILADELPHIA, PENNSYLVANIA



The Foundryman wants

Rapid Stock Removal with Long Wheel Life

Cortland has exactly the right wheels for your snagging . . . and Cortland Engineers are ready to work with you to see that you get fast, cool cutting with adequate wheel life.

All types — all sizes for swing frame, floor stand and portable machines, in standard and special combinations of abrasive, grain, grade bond and structure.

Please feel free to ask our advice about your snagging problems.

CORTLAND GRINDING WHEELS CORP.
6 Cortland Street
Chester Mass.

For Better Snagging

CORTLAND

(*Concluded from page 202*)

termine the best 1944 stockholders' reports. General's statement was adjudged the best in the nonferrous metals classification.

• • •

Bosworth Foundry Inc., Chicago, producer of brass and aluminum castings, suffered water damage to extent of approximately $7000 on Oct. 3 when an adjacent plastics plant was destroyed by fire.

• • •

Lake City Malleable Co., Cleveland, has leased from the government the DPC-financed malleable iron foundry at Akhabula, O., which the company designed, built and operated during the war.

• • •

Bethlehem Supply Co., Tulsa, Okla., plans construction of a steel and concrete assembly shop at 805 East Archer St., to cost $35 000. Hoists for oil field specialties will be built.

• • •

Mathieu Foundry Inc., Bridgeman, Mich., has been incorporated with $350,000 capital by Walter H. Steere, 409 Ridge St., Marquette, Mich. The Bridgeman plant formerly was known as Mathieu & Sons Foundry Co.

• • •

Nelson Electric & Mfg. Co., Tulsa, Okla., has let contract to Creamer & Dean for a one-story foundry building 75 x 140 ft.

• • •

Waukesha Foundry Co., Waukesha, Wis., has acquired part of I. B. Rowell Co. plant to be used for pump manufacture. The company also plans to build a one-story foundry, 64 x 200 ft, at Watertown, Wis.

• • •

Central Pattern & Foundry Co., 3737 South Sacramento Ave., Chicago was destroyed by fire Sept. 21. The one-story building was gutted and one wall collapsed. Damage is estimated at $50,000.

• • •

Atlas Brass Foundry Inc., Los Angeles, has applied for an increase in capital stock from $75,000 to $200,000. The additional funds will be used for plant expansion.

• • •

Weller Hardware & Foundry Co., Horseheads, N. Y., has changed its name to Ward Bros. Foundry Inc.

• • •

Electric Steels Ltd., Cap De La Madeleine, Que., has ceased operations due to the termination of the war.

• • •

Gebco Mfg. Co. is erecting a new foundry building at 3307 East Pice Blvd., Los Angeles, 37 x 100 ft, to cost $7500.

• • •

Maryland Sanitary Mfg. Corp., Baltimore, producer of magnesium and aluminum castings, is being liquidated.

• • •

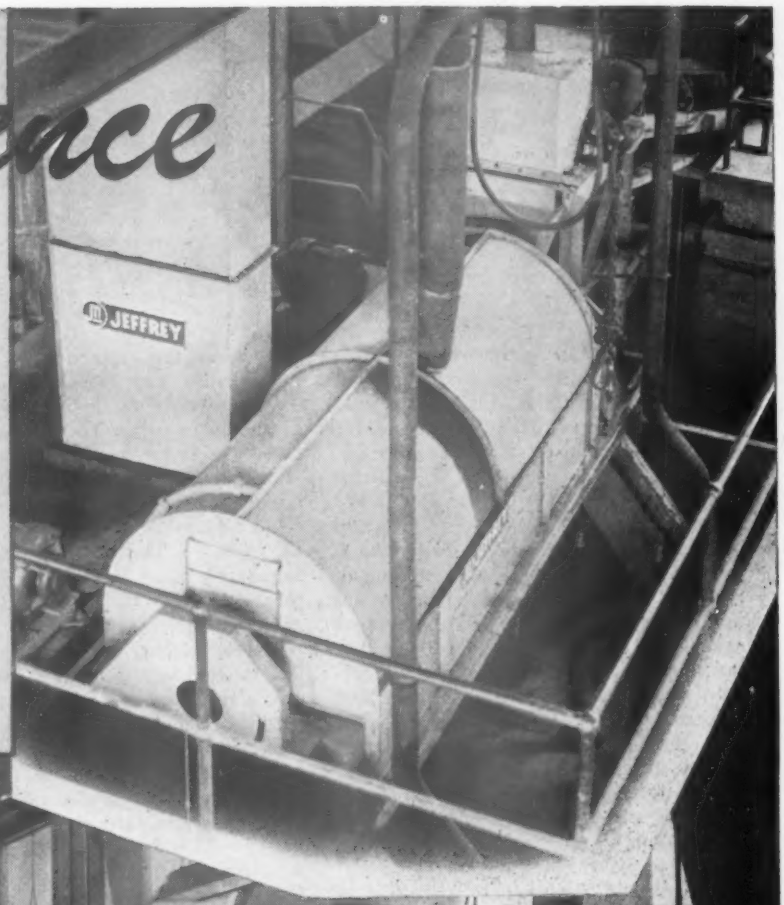
Alloy Metals Co., St. Paul, is expanding its foundry capacity at Shakopee, Minn., including installation of a new cupola.

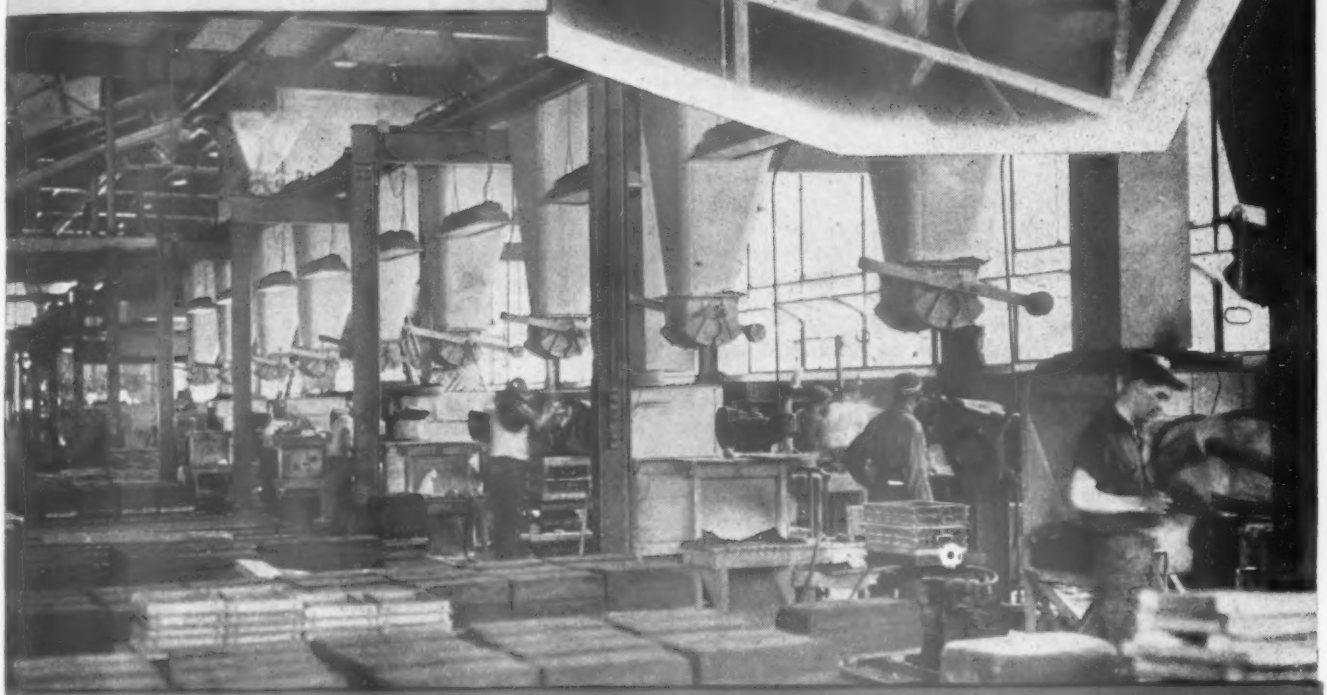
Experience Plus

CONSTANT IMPROVEMENT IN EQUIPMENT

The installation at the right shows a portion of a sand preparation plant including a magnetic separator, rotary breaker screen and bucket elevator.

Below is a battery of molders hoppers with roller conveyors leading from the molding stations to shake-out point.





THE JEFFREY MANUFACTURING COMPANY

907-99 NORTH FOURTH St., COLUMBUS 16, O.

ESTABLISHED 1877

Baltimore 1 Buffalo 1 Cleveland 13 Harlan Milwaukee 11 Pittsburgh 2
Birmingham 2 Chicago 1 Denver 2 Houston 5 New York 7 St. Louis 7 Salt Lake City
Boston 16 Cincinnati 2 Detroit 13 Huntington 10 Philadelphia 3 Scranton 3

The adventures of BILL

BY PAT DWYER
Drawings By RICHEY

ONE night recently while crossing the Public Square at the evening rush hour, Bill and I paused for a few minutes in the vicinity of the fountain where a feathery spray about 4 or 5 feet high constantly is shot upward from a jet in the center. We perched temporarily on one of the green painted slat seats thoughtfully provided by a paternal municipal government for the benefit of tired citizens, but usually preempted by a miscellaneous assortment of more or less odd characters, driftwood, bits of flotsam and jetsam thrown up by the economic and industrial tide. At this point the alert and intelligent reader probably is moved to ask, "And pray why should you two birds select such a time and place to spend an hour in a company of that kind? Ain't ye got no home or nothin' to go to?"

A civil and courteous inquiry almost invariably deserves a civil answer. Circumstances occasionally prompt a different type of answer based on the general idea that nosey people who mind their own business enjoy a higher degree of popularity than those who speak out of turn. In Bill's well considered opinion, "Them kind of people give me a severe pain in the oesophagus. They have lost the spring and can't keep their crooked traps shut." Personally and privately I do not think Bill knows where or what the oesophagus is, and I am willing at any time to lay a small wager that he cannot spell the word, but he heard it used one time and now he drags it in by the tail every chance he gets, after the fashion of a prominent radio artist who uses a word of his own invention to revive and convulse his audience when the ordinary line of patter is running rather thin. All of which leads us back by a somewhat circuitous route to the civil question, "And pray why should you two birds, etc., etc." The equally civil answer is that we were there because we were there. And I do not think anything could be fairer than that.

"Every night," said Bill, "when I get tangled up with the mob rushing across the square, I think of the beautiful theory held by many young men, lifted temporarily into positions of brief authority. You would not trust one of 'em to push a wheelbarrow, empty or full, across the yard at bright noon day. You would not trust 'em with a 2 dollar bill to go out and buy a yellow dog. You would not expect them to — O, what's the use. You would not have them around the place if they offered to pay for their board and room. And yet by the wonderful and devious workings of politics and wheels within wheels, some of these lads pose as experts and counsellers. They take themselves seriously. Offhand and without a moment's hesitation they hand out opinions and advice on subjects that would have left Solomon and the Three Wise Men of the East up a tree.

"Recently one of these men wrote an article on how to settle the labor and economic situation. He used about 3000 words—dictated probably, but not read — but his argument really was the essence of simplicity. 'When large numbers of people', says he, 'are idle in one area, gather 'em up and transport 'em to industrial areas where work is plentiful.'

"How this miracle was to be carried out, in his estimation was only a minor detail. Let some other person or persons work on that. Dash it all, you could not expect him to do everything. He sits in his richly upholstered office, collects a fat check every pay day, solves the most difficult problems without blinking an eyelash or turning a hair, and probably suggests to his chief that he is under paid and needs at least two additional secretaries.

"Look at the situation," Bill continued, "in this one single city. A vast number of people live on the west side and work on the east side. An equally great number of people live on the east side and work on the west side. Every night and every morning the square is jammed with east siders rushing west and west siders rushing east. What a fat chance any person, or any bureau or commission would have in an attempt to relocate people near their work on the east and west side.

"Troops may be moved in that manner from place to place. For the past few years they have been moved in a gigantic Virginia reel all over the world. Boys from lonely farms and from teeming cities who never had been more than a few miles from their birth place, and never expected to travel beyond that area, suddenly found themselves in

(*Continued on page* 208)

And now folks our charming quartet will sing the popular ballad "I'll Love You As You Never Were Loved Before!"

The longest crane in the world—overall length of bridge 487 feet.

AMERICAN MONORAIL CRANES

Cab control permits high piling and accurate spotting of heavy, bulky loads.

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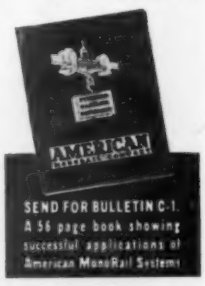
Hand operated crane for unloading trucks.

WILL SERVICE EVERY SQUARE FOOT OF YOUR OPERATING SPACE

American MonoRail Cranes supply overall coverage . . . your handling is not tied down to alleyways or spotting and unloading near permanent equipment.

American MonoRail Cranes are available for any type of job—heavy or light duty—full automatic—cab control or hand operated. They can be installed under present operating conditions without excessive structural changes.



Consult with the American MonoRail engineer, he will gladly explain this extremely easy method of handling—the low cost of installation and operation.

THE AMERICAN MONORAIL COMPANY

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Crucible Melting FOR FLEXIBILITY

Regardless of the size of the foundry, or variation in the weight of the castings, in the ferrous melting there is no range so wide and practicable as with Modern Crucible Furnaces. Crucibles provide complete flexibility for the conversion period.

A Grows with your plant, fast as you need.

B When business is slack, cut down as you wish; overhead goes down too.

C Rapidly produces clean metal with minimum skill or training of attendants.

D Production up or down, the crucible-equipped foundry operates economically with the widest margin of profit

1 Battery of stationary furnaces using No. 70 Crucibles, adapted to high-speed pouring of smaller castings on a production basis.

2 Crucible Furnaces operated in sequence, giving continuous supply of metal.

3 Pouring direct from melting crucible; saves chilling of the metal.

4 An efficient melting shop; note good fit of tongs.

Ask for Crucible Melting Handbook; the facts to meet today's melting problems.

CRUCIBLE MANUFACTURERS ASSOCIATION

90 WEST ST.
NEW YORK 6, N.Y.

(*Continued from page 206*)

places formerly referred to modestly and only by the Marines: 'Our flag's unfurled to every breeze from dawn to setting sun. We have fought in every clime or place where we could take a gun. In the snow of far off northern lands and in sunny tropic scenes, you will always find us on the job, the United States Marines.'

"Moving troops is one thing, but moving established communities is something else. Not only must a home be provided for the worker, a home also must be found for Pa and Ma, for Junior and Betty Jane, for the dog, the cat and the canary bird, for uncle Jim who never can hold a job more than 3 days, and for Aunt Emma who teaches a class of dear little tots in the kindergarten and as a result has developed a temper as sour as vinegar, a face that would stop a clock and a tongue that

Puffing Billy knows all the answers

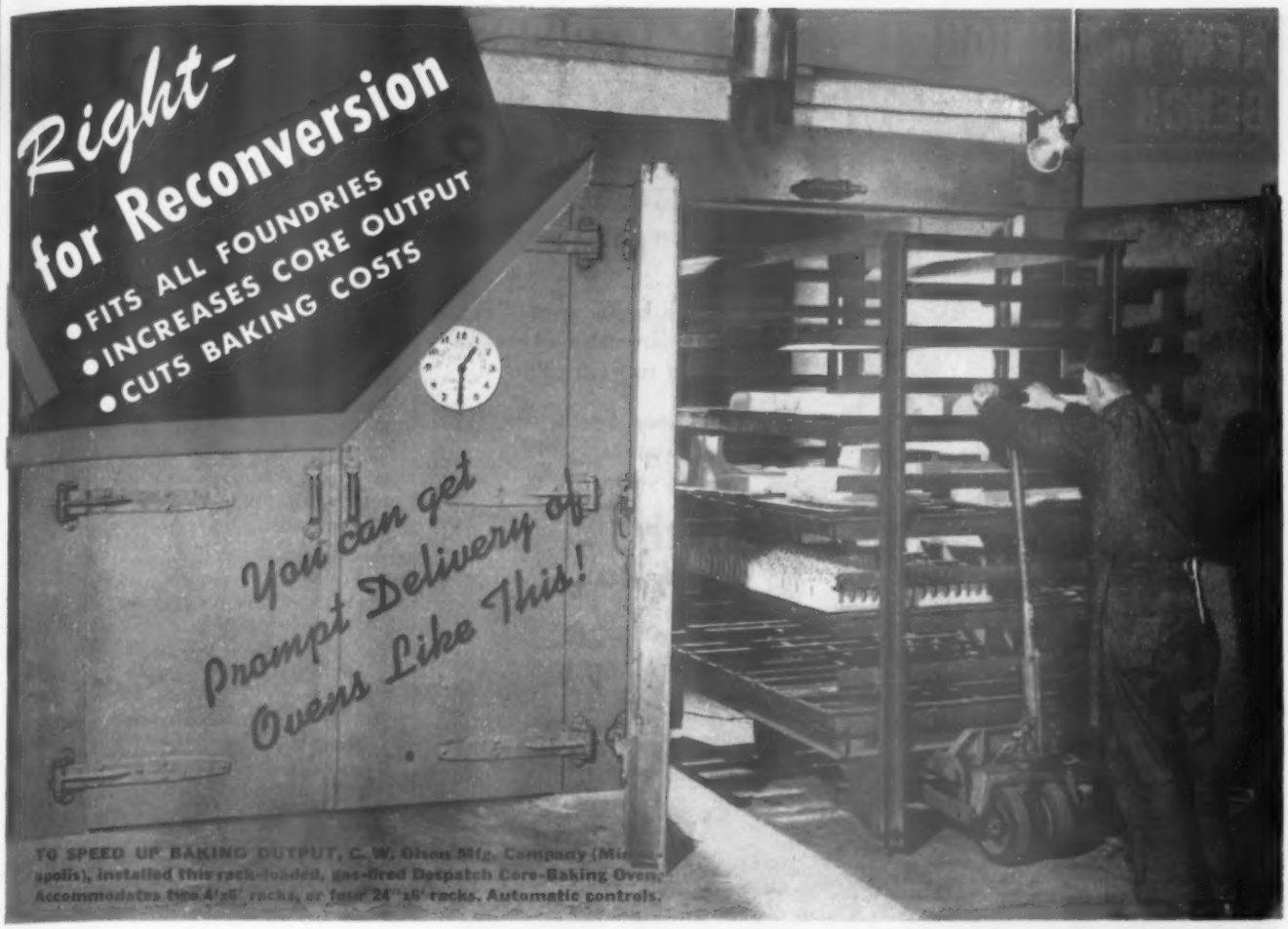
would raise blisters on the hide of an elephant."

"I think," I said, "you are too pessimistic. I know as many people in this town as you do, but I can't call to mind any family that would meet the foregoing specification."

"Well," said Bill, "I'll tell you. We have our share of freak characters in this country, ranging from the spoiled darlings of fortune who contribute absolutely nothing to the world's work all the days of their life, to the derelicts who stumble from one misfortune into another from the day they are born to the day the pitiful remains, mercifully are laid away in a neglected corner in the grave yard. However, we do not own them all. Our boys who have been ranging the far places of the world during the past few years, have seen some curious sights.

"Here is a newspaper clipping and illustration showing how the Maori ladies of New Zealand greet their friends. They do not shake hands, or rub noses or go

(*Continued on page 210*)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for Reconversion
• FITS ALL FOUNDRIES
• INCREASES CORE OUTPUT
• CUTS BAKING COSTS
You can get Prompt Delivery of Ovens Like This!

TO SPEED UP BAKING OUTPUT, C. W. Olson Mfg. Company (Minneapolis), installed this rack-loaded, gas-fired Despatch Core-Baking Oven. Accommodates two 4'x6' racks, or four 24"x8' racks. Automatic controls.

DESPATCH BATCH TYPE CORE-BAKING OVENS

IF YOURS IS A TYPICAL FOUNDRY after new business, more customers, extra profit . . . then here's a Despatch Core-Baking Oven that will help you do the job right.

What's more, you can get a rugged, compact, fast-baking oven like this delivered and installed promptly!

DOUBLES OUTPUT, ELIMINATES REJECTS

Typical of the results *you* can expect, this Despatch Oven replaces two bulky older ovens, and increases previous baking capacity . . . bakes large and small cores at same time . . . banishes stink of non-ferrous binder fumes . . . and has eliminated all rejects due to faulty baking.

ORDER NOW FOR PROMPT DELIVERY!

Get speedy installation of a Despatch Batch Oven for boosting output and cutting overhead costs. Adds to your profits. All types, all sizes, all fuels; fully guaranteed.

DESPATCH CAR-LOADED OVEN for baking large molds or cores. Handles 10 tons per charge in chamber 23 ft. long, 13 ft. wide, 8 ft. high. Combination Despatch gas or oil-fired heater.

DESPATCH RACK-LOADED OVENS, gas-fired. Available in 64 standard models and built to handle cores of all sizes. Panel construction allows low cost alteration or expansion. Ruggedly built.

WRITE FOR THESE BULLETINS

DESPATCH OVEN COMPANY MINNEAPOLIS 14 CHICAGO 1

NEW and UNIQUE! » THE CARTRIDGE BENCH CORE BLOWER

*Users report remarkable increases in quality and quantity of production

Produces variety of intricate cores with unusual speed and simplicity.

Comes ready to use—virtually no installation cost.

Can be operated with unskilled labor—extremely easy to use.

If you make cores 2 lbs. or under—this unit ideally suited to your use.

Designed by two practical foundrymen.

WRITE for complete details and new booklet

Core boxes can be made very light, in most instances bench equipment now used can be converted for blowing. Almost any sand now commonly used on the core bench may be used for blowing cores. Adjustment for boxes of different height, size and shape made instantly.

To operate, core box and cartridge are held down by pressure handle while left hand operates blow valve. After core has been blown, the box is pulled forward and cartridge is lifted off and the work of drawing core is completed on base of machine.

FILLS NEED FOR SIMPLE, FLEXIBLE BLOWER

The New *Redford Cartridge Bench Blower* has met with enthusiastic acceptance by foundrymen because it supplies an important need in the foundry for an efficient, low-cost method of blowing small, intricate cores. It requires no large volume of air and readily lends itself to handling a variety of core boxes. In fact, they tell us that it is the ideal method of making cores in single or gang boxes requiring a maximum of 2 lbs. of sand.

SAND CARTRIDGES AVAILABLE IN 8 STANDARD SIZES

Blower comes complete, ready to use. Each blower provided with one Size "C" sand cartridge which is adaptable to a large range of core boxes. Cartridges are available in seven additional standard sizes and special sizes furnished where needed.

★ Cartridge Bench Core Blowers

Redford IRON & EQUIPMENT CO.

Phone: REdford 8610

21315 West McNichols Rd. Detroit 19, Michigan

(*Continued from page* 208)

bob-bob-bobbing along like the red, red robin. Dressed simply in a gayly flowered one piece cotton garment, they stand on their generous size bare feet, while their unconfined and long black hair streams over the shoulders. The right hand and arm are extended horizontally in line with the body, while the left hand is brought to rest in the general vicinity of the oesophagus. With all the details settled to their satisfaction, the ladies open their mouths and project the tongue to the fullest extent. The young man who presented me with this noble piece of art directed my attention to the caption in a dialect peculiar to the lower east side of New York, and highly popular in the best seller *Hymie Kaplan* and as a touchstone of sophistication among readers of the *New Yorker*. Geeve a listen vunce:

You should naver feelink sorry
For New Zealander Maori;
Dees pipples always geevink you de gong!
No metter how you treat 'em
Vot heppens ven you meet 'em?
So, right avay dey steekink out de tongs!

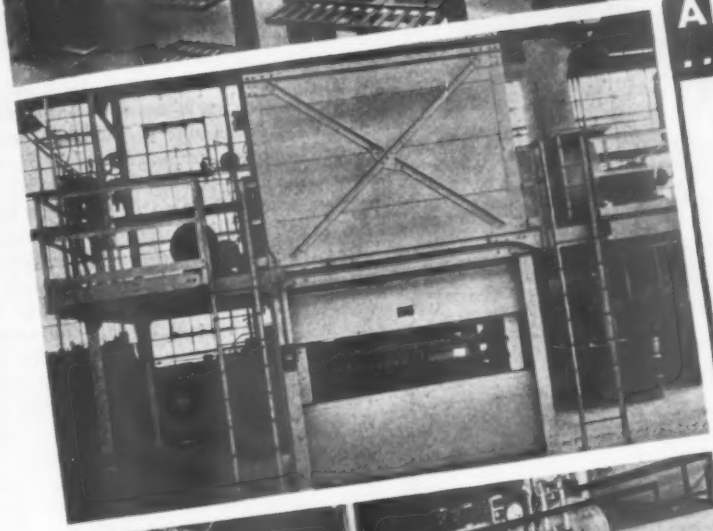
"The letter which accompanied the picture contained the following comment: 'This rather remarkable picture with poetic caption and notes, were found among the few and scattered effects of an amateur anthropologist in our outfit. In the ardent pursuit of his hobby he had wandered off into the interior of the country. Whether he finally came to rest in the interior of one or more wild men is an open question that occasionally enlivens one of our bull sessions. It is claimed that cannibalism is extinct south of the equator, but — well —take a good look at them there long tongues.'

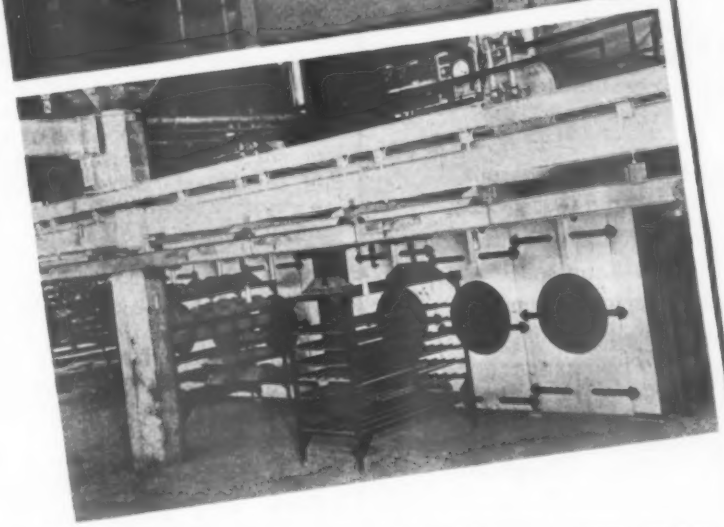
"Scrawled across the notes in a different hand, no doubt that of a left hand Republican, was the following brief but illuminating comment: 'New Zealand women welcome Mrs. Roosevelt.' A neutral savant in our group, hiccoughing mildly, maintained that the ladies had just swallowed quick shots of undiluted kangaroo sweat and simply were caught by a random photographer in the entirely justifiable act of airing their tongues. My own opinion is that the ladies picked up this charming gesture from contact with nice little girls of the so called superior white race. As a gesture of the most supreme contempt, the projected tongue probably still ranks highest among our dear little ladies and gentlemen.'

"And, now," said Bill, "coming back to our own fair land, which like every native land is the fairest land under the sun and so forth, we find citizens who take their trusty pen in hand every now and again to seek information, or to settle an argument. I had a letter recently from a man who stated that when the time came to reline the cupola, the size and shape of the tuyeres aroused considerable discussion. The cupola is 40 inches diameter inside the shell and

(*Continued on page* 212)

CARL-MAYER





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AND
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CONVEYOR
TYPES

They may be heated with
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OIL COKE COAL
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CORE RACKS
CORE AND MOLD CARS

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Packard Motor Car Co.
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by the "package"

Pangborn's new industrial Unit Type Dust Collector handles a variety of small-air-volume dust control jobs

Here is a single self-contained, ruggedly constructed unit, possessing unusual capacity, that can be adapted to a variety of work, such as grinding, polishing, buffing, blast cleaning, etc. Pangborn's "CK" occupies minimum floor space, is flexible in arrangement, easily accessible for inspection and servicing, requires minimum piping and installation expense —and offers all the benefits of Pangborn's 40-year experience in dust control.

Bulletin 910 describes such advantages as two-stage separation (minimizing filter surface wear). Address: Pangborn Corporation, Hagerstown, Md.

PANGBORN

World's Largest Manufacturer of Dust Control and Blast Cleaning Equipment

(*Continued from page* 210)

30 inches diameter inside the lining. The inquirer favored a continuous tuyere, a steel plate above and below, separated by narrow steel columns. The entire ring could be prepared in three or four sections for easy insertion at the proper area in the brick lining. With four openings in the shell, the question arises as to how far apart the plates should be, and what is the proper size for the shell opening. He further claimed that his reading seemed to indicate a lack of unanimity on this subject among writers. For example, one author claims that the tuyere area of a small cupola should be 20 per cent of the cross sectional area of the cupola, while for a large cupola 10 per cent is about the average. He wanted to know if this percentage is figured at the shell or at the opening inside the lining. If 20 per cent is the proper figure at the shell, how does one arrive at the proper percentage of the tuyere area inside the lining.

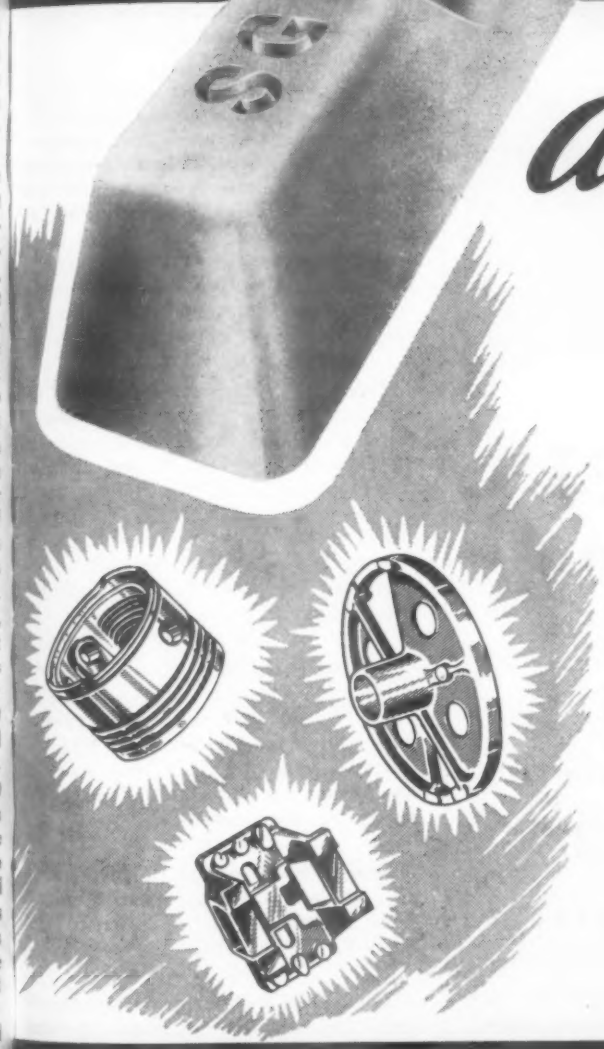
"The continuous type tuyere has been in use for many years: In some instances the openings, with the exception of narrow columns, extend through the shell. In others a definite and smaller number of openings in the shell deliver air to the continuous tuyere. In one type, one end of the tuyere casting fits closely to the opening in the shell, while the other end is flared to touch or almost touch the tuyere on either side.

"The type he has in mind could be made as he suggests by welding, but the usual practice is to cast the sectional plates in open sand molds. One pattern serves for top and bottom plates. Prongs or projecting members are cast on the bottom plates to serve as separators and supporting columns when the plates are built into the brick lining. Calculation of the actual area of the tuyeres in relation to the area of the cupola may be mildly interesting from a theoretical viewpoint, but is of little or no practical value. The only factor of any importance in the operation of a cupola is to provide a passage for a sufficient volume of air to consume a given amout of coke in a definite period. Through observation and experience, tables have been developed to show that efficient melting speed of a cupola is 10 lb of iron per hour for each square inch of cross sectional area. For a 30 in. diameter cupola the melting speed is approximately 7000 lb per hr. To attain this speed, a volume of air, 1400 cfm is needed. Under certain conditions it does not matter whether this volume of air enters the cupola through one large tuyere opening, through several small openings, or through a continuous opening. Many old time blast furnaces were blown through a single pipe nozzle with pulsating air from a bellows worked by a water wheel.

"Attempting to set up a definite and arbitrary relation hip between the cupola and tuyere areas is of no more practical value than the old time argument be-

(*Concluded on page* 214)

Better CASTINGS FROM *Aluminum* ALLOYS BORN IN THE LABORATORY



Today you produce better castings than ever before. To a large measure these improved castings are the result of more uniform alloys—alloys whose physical properties hit required specifications on the nose.

Alloys uniform in quality and meeting pin point specifications don't just happen. In our laboratories the most modern equipment available, such as the spectograph pictured above, is in constant use checking and testing so that your job is made easier. Whether you produce sand castings, die castings or hand mold castings, there is an **S-G Alloy** that's right for the job. If it's a new alloy that is called for, it too can be born in our laboratory.

Bring your casting and foundry problems to us. Our facilities are yours for the asking.

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The CLARK FLEET
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There's a machine for every need — Clark team of Fork Trucks and Industrial Tractors. Each is a fast, maneuverable, hard worker designed specifically to meet the practical working needs of a particular Material Handling job. For sound expert counsel on your Material Handling needs, talk to a Clark Field Engineer — NOW.

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INDUSTRIAL TRUCKS AND TRACTORS • HIGH-SPEED DRILLS AND REAMERS
METAL SPOKE WHEELS • GEARS AND FORGINGS • RAILWAY TRUCKS

(*Concluded from page* 212)

tween two learned supporters of opposing ecclesiastical schools of thought. Granted that angels are pure spirits, how many can stand upon the head of a pin? Common sense and ordinary foundry experience indicate that 1400 cu ft of air can be delivered readily through six or eight 4-in. diameter openings in the shell, and through a continuous tuyere 3 or 4 in. high. Successful cupola practice depends on several factors, some of more, some of lesser importance. Size and shape of the tuyeres may be included in the second classification."

OBITUARY

CARL S. Neumann, 65, president, Union Mfg. Co., New Britain, Conn., and a widely known authority on foundry practice, died Sept. 13 in that city. Mr. Neumann, a former president of the New England Foundrymen's Association, was a consultant in Washington on foundry codes in the National Recovery Administration period. A graduate of Wesleyan University, he joined the Union Mfg. Co. in 1903, became secretary in 1928 and was made president the following year.

• • •

John Noll, 84, vice president and secretary of the Falcon Bronze Co., Youngstown, O., until his retirement in 1919, died Sept. 6 in that city. Mr. Noll joined Falcon Bronze in 1900 and continued as an officer after his retirement from active participation in the company. Prior to that connection he was associated with Homer E. Hamilton Foundry, its successor the William Tod Co., and the original Valley Mould Co.

• • •

Glenn W. Files, 48, director of the technical service department, General Electric X-Ray Corp., Chicago, since 1934, died Sept. 11 in that city. As X-ray instructor in World War I, he became associated with the company in 1919. He was a co-founder of the American Society of X-Ray Technicians, and editor of the book "Medical Radiographic Technic."

• • •

William P. Collins, recently in charge of foundry production expediting for WPB in San Francisco and previously proprietor of the Western Brass Mfg. Co., died Aug. 30. He had been active in San Francisco Bay area foundry industry for four decades.

• • •

Fred H. Kruthaup, 55, production manager at the Werk Road plant of Aluminum Industries, Inc., Cincinnati, died Sept. 11 in that city.

• • •

John D. Croneweth, 64, co-founder and chairman of the board of Great Lakes Foundry Sand Co., Detroit, died Oct. 14 in that city after a brief illness. He was a member of the Detroit Board

(*Concluded on page* 216)

The PATTERN SHOP

Pete the Pattern Maker says:

"If you figger on buildin' a monument to your hero, build it out of bricks, so you'll have somethin' convenient to throw at him when he passes by."

The Precision Cement

MASTER Dural Cement meets today's demands for close working tolerances and production speed in making patterns and foundry castings. It helps the patternmaker hold his patterns to close dimensions, and retains those dimensions over a long period of time without expansion, shrinkage, warp, twist, burn, rot, or falling apart.

MASTER Dural Cement has the lowest expansion of any known plaster, and has three times the compressive strength of molding plaster. It can be cast against metal, plaster, wood, rubber, clay and any other material not affected by increases in temperature.

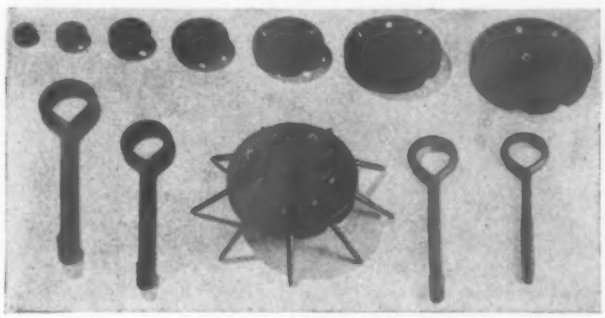
The low expansion and great hardness of MASTER Dural Cement is ideal for Keller Machine patterns. It is unexcelled for general purpose modeling, molding, pattern proving and patchwork.

Write Kindt-Collins Co., 12651 Elmwood Ave., Cleveland 11, Ohio, for full details, properties, and prices of MASTER Dural Cement. Note: We also have MASTER-STONE super-strength cement for hard use in production. It has the highest compressive strength of any known plaster. Ask for details.

NEW Rapping Plates

You'll get a better quality of work—at reduced costs—by standardizing on the new MASTER Rapping Plates in your foundry. They assure these quality features:

1. Applied in less time. The 1° taper on the side assures a tight driving fit.
2. Thicker, consequently they have greater contact surface on the wood for solid anchorage.
3. Diagonal screws give considerably more holding power than if screws were driven in straight. This diagonal direction also permits the use of longer screws in the same thickness of wood.



4. Longer life—cast from high-grade malleable iron.
5. Will eliminate, to a large degree, the present-day maintenance cost of Rapping Plates. If screws come loose through continued hammering, the old screws can be extracted, the Rapping Plate given an eighth of a turn, and all new screw holes will again anchor the plate as tight as it was originally.
6. 7 sizes—from No. 0 to No. 6 inclusive in sizes from 1" diameter by 3/16" thick to 5" diameter by 3/4" thick—to cover most Rapping Plate applications.

Write for full size detail blueprint of all MASTER Rapping Plates and Lifting Screws.

MASTER Hard Pattern Wax

This is an improved hard pattern wax, that will not soften when it comes in contact with warm sand in foundry. Another feature is that it can be covered with MASTER Pat-Kote coating, or shellac, and will quickly and positively dry to assure a good job. Use this extra-value wax to fill up defects and nail holes in wood patterns, and assure yourself of better-looking jobs. Send in your order today.

MASTER Aluminum Hard Wax

Possesses the same highly-desirable physical properties of MASTER Hard Pattern Wax, but is aluminum color for metal and aluminum work. Will stick to aluminum—excellent for filling defects in aluminum castings—hardens instantly. Write for details.

Pete the Patternmaker says: "What's the use of havin' a dog if you're goin' to do all the barkin' yourself."

* * *

Files for Fast Cutting

Kindt-Collins has a file for every need in your shop, to help you cut, plane and shape wood and metal better and faster. Kindt-Collins MASTER Milled Curved Tooth Files have an unusual *cutting* action—which functions in a manner similar to that of a wood plane used for finishing wood surfaces. Sharp, keen edges, plus generous clearance (these are patented improvements) make MASTER Milled Curved Tooth Files particularly suitable for soft and sticky non-ferrous metals like solder, brass, aluminum, babbitt, Kirksite, plastics, etc. These files will not clog or scratch. Made in a number of types and sizes—all can be resharpened at a fraction of their original cost. Write for full details and prices. We also have a complete line of general industrial files.

Order Direct

Order all your pattern shop and foundry supply needs direct from Kindt-Collins, for quick delivery of factory-fresh stocks at attractive prices. Write or wire your wants—we can assure you prompt delivery on all obtainable supplies.

MASTER Disc Cement

Here's a handy product that eliminates needless time lost in changing abrasive discs. MASTER Disc Cement permits easy disc changing, and encourages the quick application of new, efficient-cutting discs to replace worn, slow-cutting discs. It assures an absolutely *tight* bond on paper- or cloth-backed abrasives, but is not designed for heavy fibre-backed discs. Save time, save labor, save money—and get a better quality of cutting work—by using MASTER Disc Cement. Put up in one-quart containers only. Send your order for a trial can today.

Saw Lubricator Literature

Describes how MASTER Saw Lubricator can make your saws cut faster, cut easier and last longer. Write for this money-saving information.

THE KINDT-COLLINS CO.

Everything for the Pattern Shop

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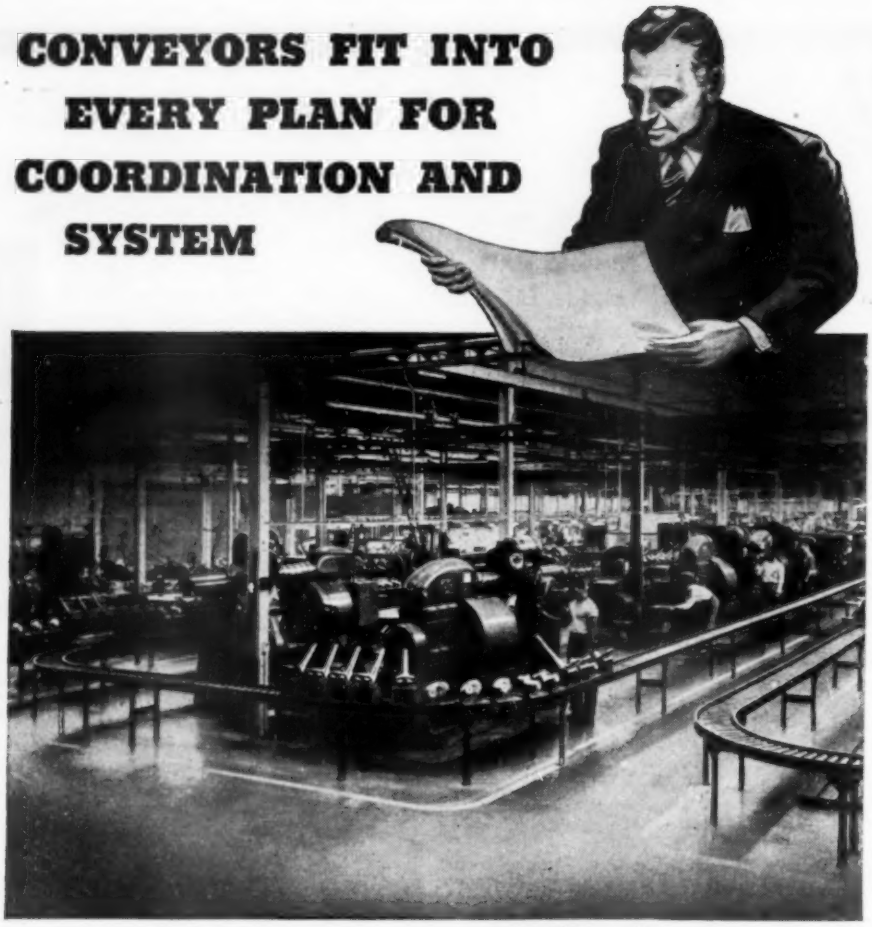
CONVEYORS FIT INTO EVERY PLAN FOR COORDINATION AND SYSTEM



...WITH THE *Plus* OF *FAST* LOW-COST HANDLING

Conveyors are an important weapon in your war on waste and inefficiency. They contribute substantially to the elimination of disorder and confusion—congestion—working hazards.

When you plan for faster, better organized production — check your plan thoroughly on the score of conveying and conveyors.

Why not check with Standard Conveyor—builders of an unusually wide variety of conveying equipment including power and gravity conveyors in belt, roller, chain and slat types, spiral chutes, piling and lifting machines, pneumatic tube systems.

Whether commodities — boxes, cartons, parts, units, packages—have to be moved in a straight line, a curve, up, down, or across, there is Standard equipment to do the job, developed in more than 40 years of service to business and industry.

Write for valuable reference book "Conveyors by Standard," Catalog No. F-115.

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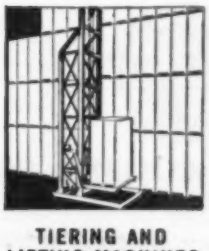
Sales and Service in Principal Cities


TIERING AND LIFTING MACHINES

PORTABLE PILERS

SPIRAL CHUTES

PNEUMATIC TUBE SYSTEMS

(*Concluded from page* 214)

of Commerce, National Industrial Sand Association, Foundry Equipment Manufacturers Association and American Foundrymen's Association.

• • •

Leo B. Brabant, president and founder of Brabant Brass Mfg. Co., Detroit, died Aug. 8, in that city.

• • •

Maxwell G. Tielke, 77, president Crucible Steel Casting Co., Cleveland, died Sept. 19, in that city. Mr. Tielke became associated with the company in 1912. His two sons, Homer F. and Maxwell H., hold executive positions with the concern.

• • •

August Ebel, 74, former vice president of the old Richland Foundry Co., Belleville, Ill., died there Sept. 27.

• • •

Carl Sivright, 59, who retired in 1944 as chairman, Oliver Corp., Chicago, formerly the Oliver Farm Equipment Co., died Oct. 10 in Evanston, Ill. He became associated with the company in 1930.

New Representatives Appointed

The Ironton Fire Brick Co., Ironton, O., has announced the following sales appointments: Earl A. Swenson, representative in the Ohio-Virginia territory; N. G. Phelps, the state of California; and Carl F. Miller & Co., the states of Washington and Oregon. Pennsylvania Foundry Supply & Sand Co. will represent the company in southeastern Pennsylvania and the states of Delaware and New Jersey.

Issues Bulletin On Union Contracts

Labor Relations Institute, New York, has published the third of a series of special reports on collective bargaining techniques, entitled "Tested Clauses For Union Contracts." The report is designed to aid employers in negotiating agreements with labor unions and treats all principal points covered in a typical contract negotiation. Copies of the guide may be secured from the institute at $2.25.

Orders For Foundry Equipment Heavier

August sales of foundry equipment represented 532.2 per cent of the 1937-1939 monthly average, according to the Foundry Equipment Manufacturers Association. This marked the third consecutive monthly increase. The index was 411.7 in July, 375.4 in June and 430.5 in August, 1944.

MOLDS CORES

WAR RESTRICTIONS GONE—NOW AVAILABLE TO ALL!

PARASPRAY

FOR FERROUS—NON FERROUS—ALLOY CASTINGS

PARACOAT

PATTERNS

WAR USERS DECLARE—

They did a job—saved lives by improving quality and stepping up production of vital castings.

PARA PRODUCTS

Are cutting costs and making better Ferrous—non Ferrous—Alloy Castings for many foundries.

KEEP COMPETITIVE

Send for our technical bulletins and test samples. Rubber Chemicals have proven they have a place in every foundry. Our technical service staff is at your command.

FOUNDRY RUBBER
SPECIFICATED

FILL OUT— TEAR OFF—MAIL TODAY!

Gentlemen:
Without charge or obligation please forward me the items checked below. I understand that test samples will be shipped express prepaid.

Name of Product	Product Use	Additional Information	Free Test Samples
PARASPRAY	Core and Mold Surfacer		
PARACOAT	Pattern Coating		
PARALOXET	Core Binder (Presently not available)		
PARASOLV	Thinner and Cleaner		
BONISPRAY	Permanent Mold and Die Casting		

Requested by..... Position.....
Firm Name..... Shipping Address.....

REPRODUCING Pattern Layouts

By ARTHUR H. ALLEN
Detroit Editor
THE FOUNDRY

ACCURATE reproduction of engineering layouts — patterns, aircraft lofts, templates, full-size autobody detail and similar work—has been an essential phase of pre-production practice. Where original layouts are scribed on metal sheets instead of using the less accurate method of drawing paper - tracing - blueprint, a conventional method of reproduction has been by means of the camera, producing a negative of reduced size which in turn can be projected to full size and reproductions run off. However, in this system, accuracy of detail suffers and, particularly in the aircraft and pattern industries, greater precision is necessary.

A new system for production of direct contact reflex negatives and prints, requiring no camera or projection equipment, has come into fairly wide acceptance in the aircraft industry and pattern shops, especially in the Middle West, and gives promise of important advantages in other fields in the future. Developed by Bartheld Zeunen and now being used by Capitol Engineering Reproduction Co., Detroit, it can be explained best by following through the steps necessary in the reproduction of a typical pattern shop layout.

The original layout should be well scribed on a black background, using specially coated aluminum or steel sheets. Purple or blue backgrounds can be handled, but black is preferable. Conventional practice in this field has been

(*Continued on page 220*)

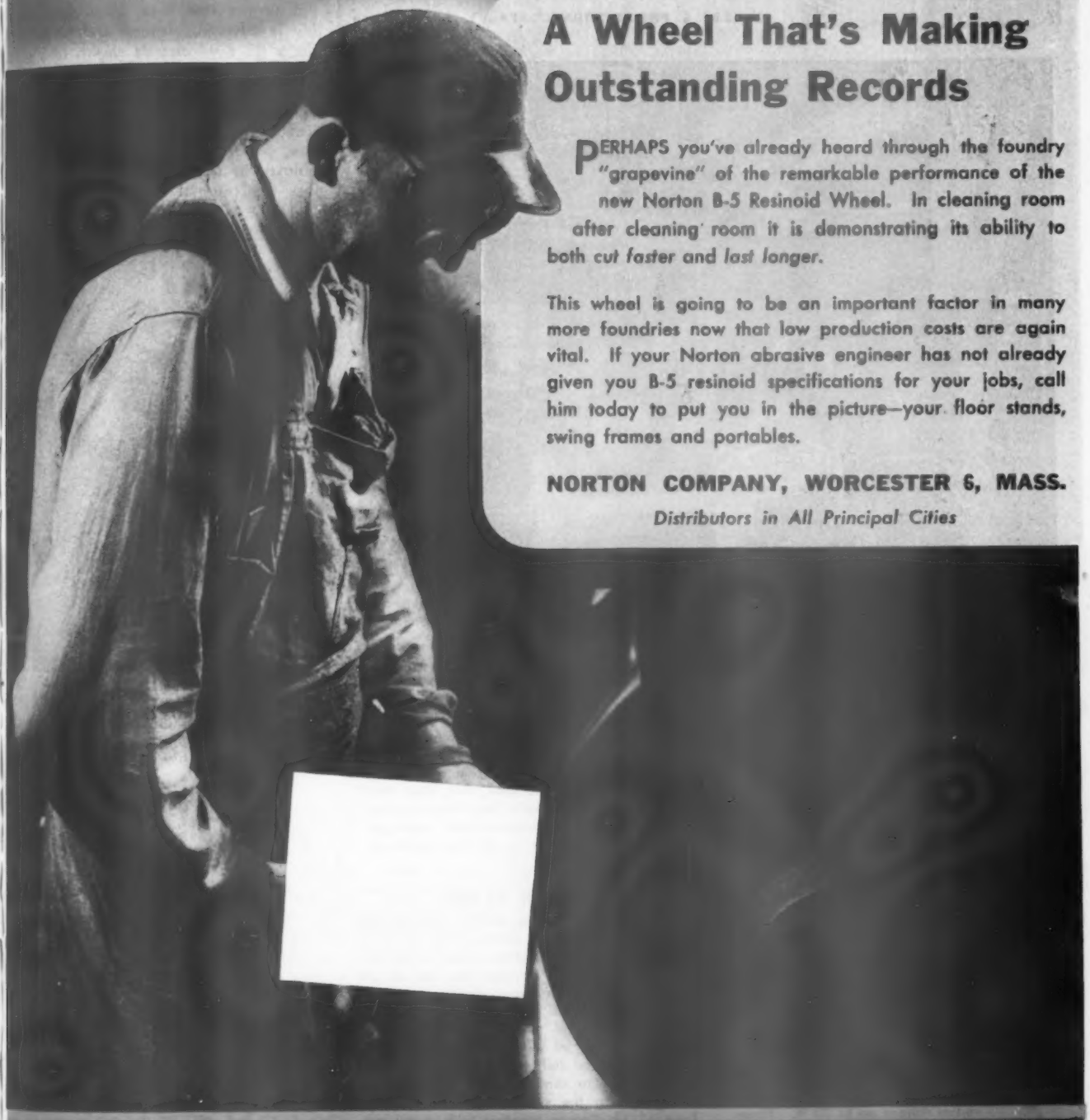
Fig. 1 (top)—Treated glass negative is placed in vacuum printing frame with exposed lights above and original layout on metal sheet below negative plate

Fig. 2 (left center)—Water sprays wash ink from exposed portions of negative to bring out layout details

Fig. 3 (left)—Pouring light sensitive dichromate solution on glass negative before placing latter in printing frame

PICTURE

Your Castings in Front of the NEW Norton B-5 Resinoid



A Wheel That's Making Outstanding Records

PERHAPS you've already heard through the foundry "grapevine" of the remarkable performance of the new Norton B-5 Resinoid Wheel. In cleaning room after cleaning room it is demonstrating its ability to both *cut faster* and *last longer*.

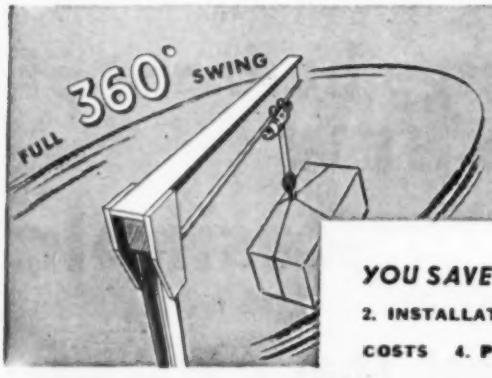
This wheel is going to be an important factor in many more foundries now that low production costs are again vital. If your Norton abrasive engineer has not already given you B-5 resinoid specifications for your jobs, call him today to put you in the picture—your floor stands, swing frames and portables.

NORTON COMPANY, WORCESTER 6, MASS.

Distributors in All Principal Cities

NORTON ABRASIVES

W-1030



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SPEED

POINT-OF-OPERATION JOBS

YOU SAVE... 1. MANPOWER 2. INSTALLATION COSTS 3. COMPENSATION COSTS 4. PRODUCTION COSTS 5. MAN-HOURS

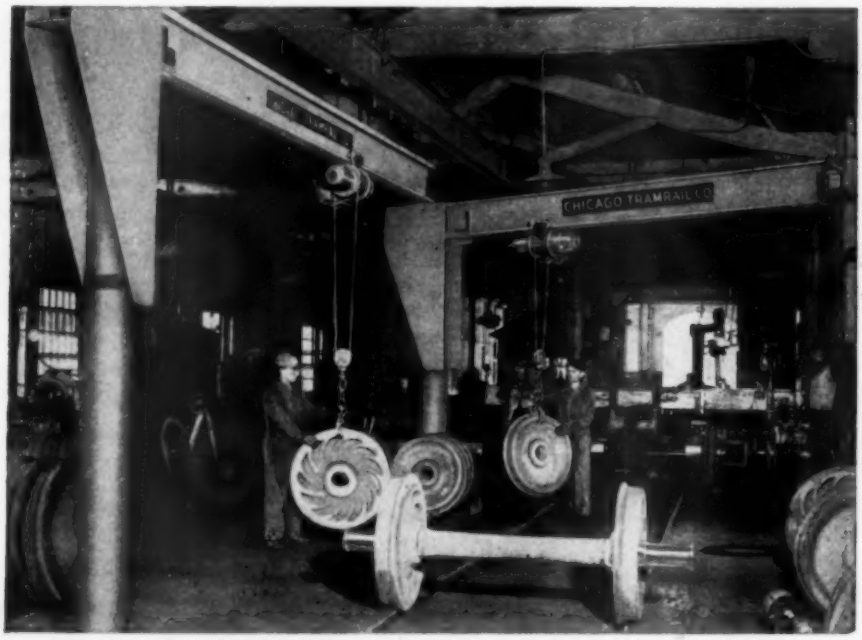
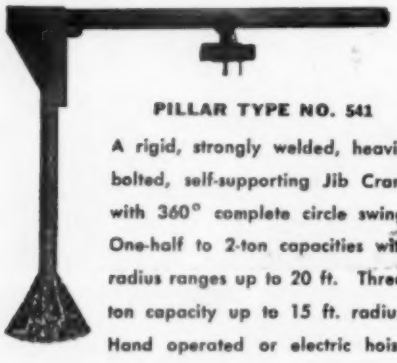


Photo courtesy of Union Pacific Railroad

The assembly of railroad wheel-and-axle units is a job that calls for precise coordination in heavy handling. Too light a job for costly overhead cranes, and too dangerous for all but the most skilled manual labor, it is an ideal application for fast-action, flexible Jib Cranes. Working in conjunction, the two nimble Jib Cranes ease the wheels into place on the axle swiftly and surely, without danger to the delicate bearing surfaces of the axle or journal. This used to be a job for skilled workmen, but now easy-to-operate Jib Cranes take over the difficult task—a real help in these labor-scarce times.

Jib Cranes help to reduce compensation costs because they lessen the probability of accidents that are so frequent in heavy handling. For example; the operation above was formerly a dangerous one. Many strains and broken bones resulted from rolling the heavy wheels into position, but now the men have only to guide the free-swinging Jib Cranes as they swing around, pick up the wheel and carry it to the point of assembly.



PILLAR TYPE NO. 541

A rigid, strongly welded, heavily bolted, self-supporting Jib Crane with 360° complete circle swing. One-half to 2-ton capacities with radius ranges up to 20 ft. Three-ton capacity up to 15 ft. radius. Hand operated or electric hoist.

IN YOUR PLANT

It's easy to see how swiftly, economically and safely Jib Cranes perform the operation illustrated. You can effect these same savings in your plant through the use of Jib Cranes. Look around your plant—you're sure to see many places where the use of these sturdy "mechanical muscles" will save you time and money as well as speed up production. Write for full particulars today. We will be glad to send you an illustrated circular showing the various types of Chicago Tramrail Jib Cranes together with many suggested applications for their use.

WRITE TODAY!

CHICAGO TRAMRAIL COMPANY

2910 CARROLL AVE. Phone KEDzie 7475 CHICAGO, ILL.

(*Continued from page 218*)

to use blued sheets, but it has been found that actually black is more restful to the eyes of the layout man.

After cleaning with soap and water, oxalic acid, and drying, the layout is prepared by rubbing powdered magnesia into the scribed lines to obtain maximum contrast. If the layout is old and contrast is poor it can be rerolled with ink and drier. The layout then is placed face up on a rubber blanket in a vacuum printing frame, as shown in Fig. 1.

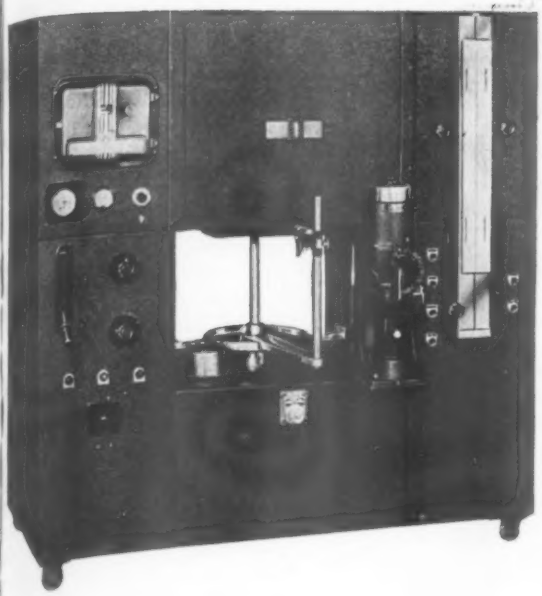
A proper size ¼-in. glass plate negative is selected, cleaned and rinsed and placed in a whirler as shown in Fig. 3, with dichromate reflex negative solution poured over the surface. The plate is whirled for a few minutes to get uniform distribution of the solution over the glass. After it dries, the glass plate is removed to the printing frame and placed over the original layout, emulsion side

Fig. 4—Opaque solution is used to touch out spots on glass negative and to blank out any changes desired in layout before printing

down. Areas of the original not covered by the glass negative are blocked out with ¼-in. plate glass to prevent them from buckling when the top section of the printing frame is cranked down over the negative and original. This top section is a steel frame with a clear glass plate, which fits tightly over the lower section and permits air to be pumped out of the space between the two sections in order to bring the negative and original into the closest possible contact. When the two sections are locked together, the vacuum pump is turned on until a pressure dial reads 15 psi. Six 1500-watt lamps above the frame are illuminated to expose the negative for about 5 minutes.

An automatic timer controls the exposure time, after which the lights are extinguished, the vacuum broken and the frame cranked up to permit removal of the exposed negative. Exposed side

(*Continued on page 222*)



KNOW IN ADVANCE HOW YOUR SAND WILL BEHAVE AT METAL POURING TEMPERATURES

THE HITEMP DILATOMETER helps you determine the causes of such defects as rat tails, scabs, buckles, fissures, veining, hot tears, metal penetration, oxide penetration, blows, dirt inclusion and cuts.

Accessories provided to conduct the following tests:

1. Hot spalling test
2. Hot shrinkage test
3. Expansion-contraction test
4. Hot strength test
5. Hot deformation test
6. Hot gas pressure test
7. Mold atmosphere test
8. Oxide-metal penetration test
9. Own atmosphere tests
10. Hot collapsibility test
11. Refractoriness visual test
12. Hot permeability determination
13. Protective coating visual test
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High Temperature Testing Helps Produce Better Castings

HIGH TEMPERATURE TESTING of molding sands, cores, protective coatings and refractories, provides practical test data to both the technical and operating staffs.

A gas-tight observation port on the Hitemp Dilatometer permits the operator to visually observe how these important materials behave at *metal pouring temperatures.* Many speculations and false impressions are eliminated, enabling the technician to arrive at accurate analysis of casting defect causes.

The large **No. 752 HITEMP DILATOMETER** is designed for both routine sand control tests and for research tests on all molding and refractory materials.

AUTOMATIC CONTROLS provide precise temperature regulation, power input, rate of heating, rate of deformation, power specimen charging into furnace and atmosphere control.

SUITABLE FOR SPECIMENS 1⅛ inch or 2 inch in cross section. Range of test load is up to 6000 psi. for 1⅛ diameter specimen and 1890 psi. for 2 inch diameter.

WRITE FOR BULLETIN. *Also available upon request are reprints of articles presented before the A.F.A. on the subject of controlled molding materials at elevated temperatures.*

CONTROL EQUIPMENT SAVES TIME

Harry W. Dietert Co.

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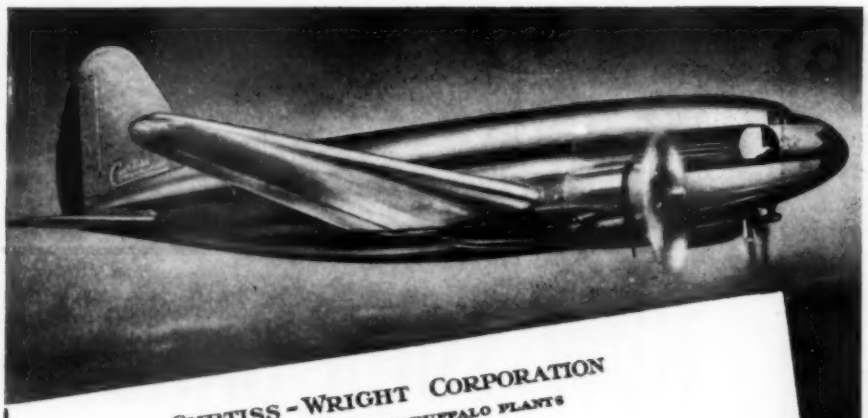

CURTISS-WRIGHT CORPORATION
AIRPLANE DIVISION-BUFFALO PLANTS
BUFFALO, N.Y.

September 12, 1945

Buell Engineering Co., Inc.
70 Pine Street
New York 5, New York

Gentlemen:

It is a pleasure to answer the recent inquiry from your Engineering Department checking upon the mechanical operation of the Buell Dust Recovery Systems installed in our three plants.

Buell Fly Ash Collectors have been in service on twelve (12) boilers since 1941, operating continuously.

Since the time of their installation, they have cost us nothing for maintenance or repair. Their collection efficiency has fully met our requirements, and they have accomplished in a highly satisfactory manner the job for which they were installed.

Yours very truly

Guy Maher

Guy Maher, Plant Engineer
CURTISS-WRIGHT CORPORATION
Plant #2

• BUELL DUST RECOVERY SYSTEMS are used throughout industry in the collection or reclamation of many kinds of dust, in numerous production and process operations. Hundreds of satisfied industrial users will attest to Buell's—"High Efficiency, Low Maintenance, Long Life."

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DUST RECOVERY SYSTEMS

Write for Buell's new, revised book "The Buell {van Tongeren} System of Industrial Dust Recovery" now in its fourth printing.

BUELL ENGINEERING COMPANY, INC.
14 Cedar Street, New York 5, N. Y.
Sales Representatives in Principal Cities

DESIGNED TO DO A JOB, NOT JUST TO MEET A "SPEC"

(*Continued from page 220*)

up, the negative is rolled with ink and the inked glass then is carried to a developing sink where a sprinkler pipe sprays the glass with light streams of water and the layout is "developed" with the assistance of small water and air spray guns or a light rubbing with cotton. Fig. 2 shows this step.

Because of the difference in the amount of light reflected from light lines and dark backgrounds of the original, the light sensitive dichromate chemical on the negative is "exposed" to a greater degree in those portions in contact with the scribed lines on the original. Thus, when the negative is inked and developed, the ink adheres to the background, but washes off the highly exposed or "line" portions, giving an exact copy of the original on the glass.

After drying, the negative is coated with powdered lamp black to increase

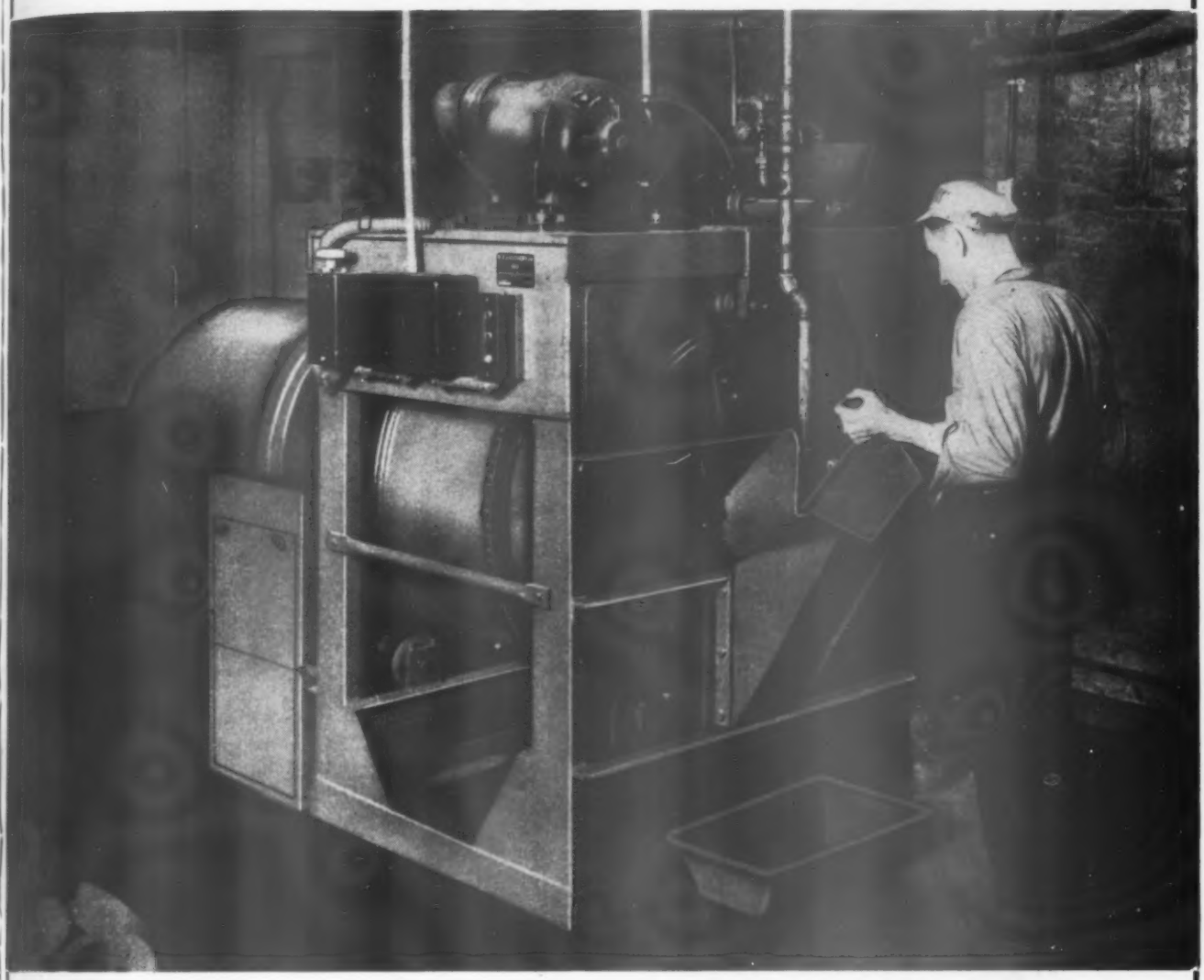
Fig. 5—Greater contrast is obtained in layout details by etching finished print in iron chloride solution

contrast, excess amounts being wiped off. It is then taken to a retouching table where spots can be painted out with the use of "opaque," along with any detail which is not desired on the succeeding print or positive. This touch-up work is done by an operator with a brush as shown in Fig. 4. After coating with a transparent protector solution, the negative is ready for printing or storage pending printing.

The printing process is somewhat similar to negative making. The proper size aluminum or steel sheet is cleaned and polished, all burrs removed from the edges, and a so-called "cold top" or light sensitive solution poured over the surface in the whirler. After it is whirled and dried it is transferred to the printing frame and the negative placed over it, emulsion side down. Exposure is

(*Concluded on page 224*)

RANSOHOFF AUTOMATIC STAR RETURN WET CLEANING MILLS



SAVE 30% to 70% ON YOUR CLEANING COSTS

NO WET OR MESSY FLOORS

gentle . . . economical . . . easy . . . automatic handling of stars . . . not self-destructive

THE NEWEST AND MOST ECONOMICAL WAY TO CLEAN BRASS CASTINGS:

THE RANSOHOFF WAY IS THE BEST WAY . . .
note how easy and economical in time, labor and cost:

After shaking out brass castings are charged into the machine where they are cleaned with brass stars or crucible droppings. The castings cascade in a mass with the cleaning material intermingled so that there are no voids. Stars or droppings are automatically separated from the work during discharge and return automatically to the tumbling compartment so the cleaning proceeds with utmost rapidity and efficiency. The sand conveyor receives the sand as it is flushed from the cleaning mill.
There's no breaking, nicking or mill wear. No dust collectors are needed, which saves cost and maintenance. Mills are not self-destructive.

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back again for Better FOUNDRY SERVICE

THE M·S·A

ALUMINUM Dustfoe RESPIRATOR

U. S. Bureau of Mines Approved

LIGHTWEIGHT!
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ADJUSTABLE FACEPIECE!
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The famous M.S.A. Dustfoe Respirator, with aluminum facepiece and filter container, is again available to the foundry worker. Unaffected by heat conditions on the job, the Aluminum Dustfoe Respirator is strong and durable, yet compact and lightweight for maximum wearing comfort. The cushion facepiece is adjustable for perfect individual fit on any face—all parts are replaceable and interchangeable—the entire unit can be cleaned and sterilized with the exception of the inexpensive throwaway filters. Send us your requirements!

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District Representatives in Principal Cities
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Toronto, Montreal, Calgary, Vancouver, New Glasgow, N. S.

(*Concluded from page 222*)

similar to that in making the negative and the exposed metal sheet is transferred to a cold top developing bath. After a suitable developing interval the sheet is moved to the developing sink where the details of the layout are brought out by immersion or spray, plus a light rubbing with cotton. The cold top does not adhere to the exposed portions of the sheet which can be etched to any desired depth by iron chloride solution, Fig. 5, thus providing the layout in the color of the metal sheet, with background black.

Many variations of the printing process are possible, such as direct contact loft printing and direct contact template printing.

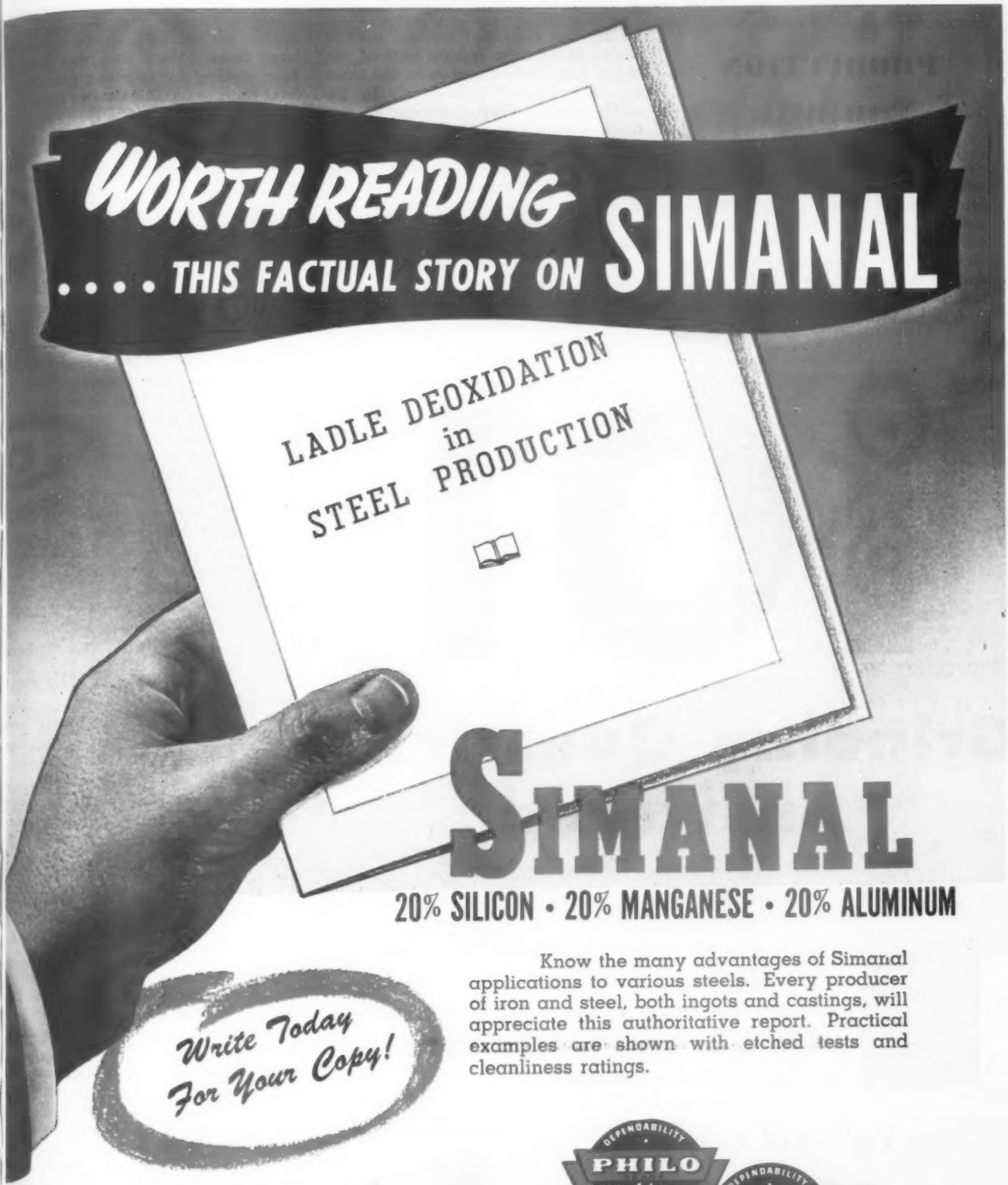
Another variation is the production of "flop" negatives for double prints, where one half of the negative is the exact reverse of the other. In this case it is necessary to make an original of only one half.

While this process may sound complicated, it actually is quite simple, and requires no great amount of equipment beyond the vacuum printing frame, spray booths, the whirling machine and several shallow tanks for solutions and developing work. The faithful reproduction of minutest details on layouts has to be seen to be appreciated, but an inspection of scores of layouts in the form of pattern shop sheets, lofts and templates by this writer shows reproductions exact in every detail, including the gradations in strengths of various lines.

An important advantage of the process is that as many "prints" as are desired can be produced from the glass negatives. Thus, if a contractor requires multiple sets of layouts to furnish various subcontractors, they can be produced readily, and each one will be exactly like the original layout. There can be no quibbling with subcontractors over dimensional limits since they are all faithfully reproduced in metal and can be gaged off accurately. Important time savings likewise accrue.

Publishes First-Aid Workers' Guide

American Mutual Liability Insurance Co., 142 Berkeley St., Boston 16, has available a booklet, "Standing Orders For First-Aid Workers In Industry," which covers recognition and proper emergency treatment of a wide variety of industrial injuries. A discussion of supplies, records, physical arrangements of first-aid rooms, transportation of injured persons and emergency procedures in industry, is well handled with the foreword cautioning that orders are subject to approval, amendment, or revision by the plant physician. Prepared for policyholders, copies of the booklet are available to others as long as the supply lasts.



Know the many advantages of Simanal applications to various steels. Every producer of iron and steel, both ingots and castings, will appreciate this authoritative report. Practical examples are shown with etched tests and cleanliness ratings.

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Ohio Ferro-Alloys Corporation

Canton, Ohio

Chicago Detroit Pittsburgh San Francisco Tacoma

GRAY IRON PRODUCTION FOR WAR

(*Continued from page* 101)

were available to do this task, limitations often occurred in floor space. The problem was solved by stacking the molds, one on top of the other, as high as it was possible to go and still provide clearance under the cranes for the pouring ladles. In shops producing small castings such as bombs and grenades, it was common to employ this same principle which in this case resembled methods used in casting piston rings, radiator sections, etc. Molds were stacked one upon the other with the elevation limited only by the clearance under the roof or crane in cases where large pouring ladles were used, or alternately, to the level to which men could lift the ladles where hand pouring methods were practiced. An illustration of machine molds of this type and their assembly on the foundry floor appear in Figs. 9, 10 and 11.

Less spectacular but equally versatile methods were employed in jobbing shops where custom-made castings in small numbers were produced. Large castings would be rammed with sand slinger[s] massive jolt machines capable of handli[ng] large flasks. Much time was saved [in] floor molding by installing permanent[ly] level floors or leveling devices in the bo[t]toms of pit or floor molds.

During the war, the iron foundry taught its associated metal forming industries a number of improvements and it learned a number in return. Centrifugal casting achieved new high stages of accomplishment. Shops that had been accustomed to making centrifugally cast pipe succeeded in producing alloy steel cylinders for aircraft, hollow steel shafts for marine service, and small diameter (75 mm) pipe, 10 mm thick and 7.5 m long made of alloy steel of the 18 per cent Cr–8 per cent Ni or 25 per cent Cr—20 per cent Ni alloy with flanges welded on. Some of these activities were related to the centrifugal casting of gun tubes of steel whose production had been established long before the war.

Vertical spinning machines as well as horizontal spinning machines were developed for various purposes. The nickel-chromium-molybdenum cast iron lining in a steel shell type of casting became an important component in the form of an aircraft brake drum. Fig. 7 illustrates a cross-sectional view of this product. Vertical axis machines were used for casting gear blanks and flywheels while clusters of castings in the familiar "Christmas tree" formation, (Fig. 1[8]) were produced by the centrifuge casting principle. The scarcity of forging hammers led to the development of centrifuge die cast parts[4] which possessed close dimensional tolerances in addition to high quality. Some of these castings are made in a carousel type of spinning machine in which molds are spaced at regular intervals around a circle, poured from and spun around a central axis rather than the usual practice of spinning castings about their own axis.

Produce Accurate Castings

The trend toward dimensional accuracy was also accentuated by progress in the application of the "lost wax" process to the production of precision castings. The ability to produce castings that approximate finished dimensions without machining, is bound to attract the manufacturer whose products may cost 50 to 100 times more to machine than they do to cast. An accuracy of about .001-in. per inch is promised and a higher order of accuracy may develop with experience in compounding algebraically, the thermal expansion and pattern-shrinkage of pattern, wax, mold and casting.

Research upon refractories, facings and binders used in the process is in progress, and improvements are destined to be rapid. Gating, risering and coring such castings challenge the skill of the foundryman, and mechanical aids to the rapid flow of metal such as centrifugal, vacuum or pressure casting are being developed which will rapidly extend the application of this type of foundry product.

Directional solidification, embodying

(*Continued on page* 228)

101 Grinding Questions Answered

By Allen Steele, Manager, Dayton Grinding Wheel Division
SIMONDS WORDEN WHITE COMPANY

Now in its second edition . . . 101 answers to many of the more common grinding problems . . . indexed for quick, easy reference. Sent without cost to anyone interested in better grinding practices. Just fill out and mail the coupon below.

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Please send me free booklet "101 Grinding Questions Answered"

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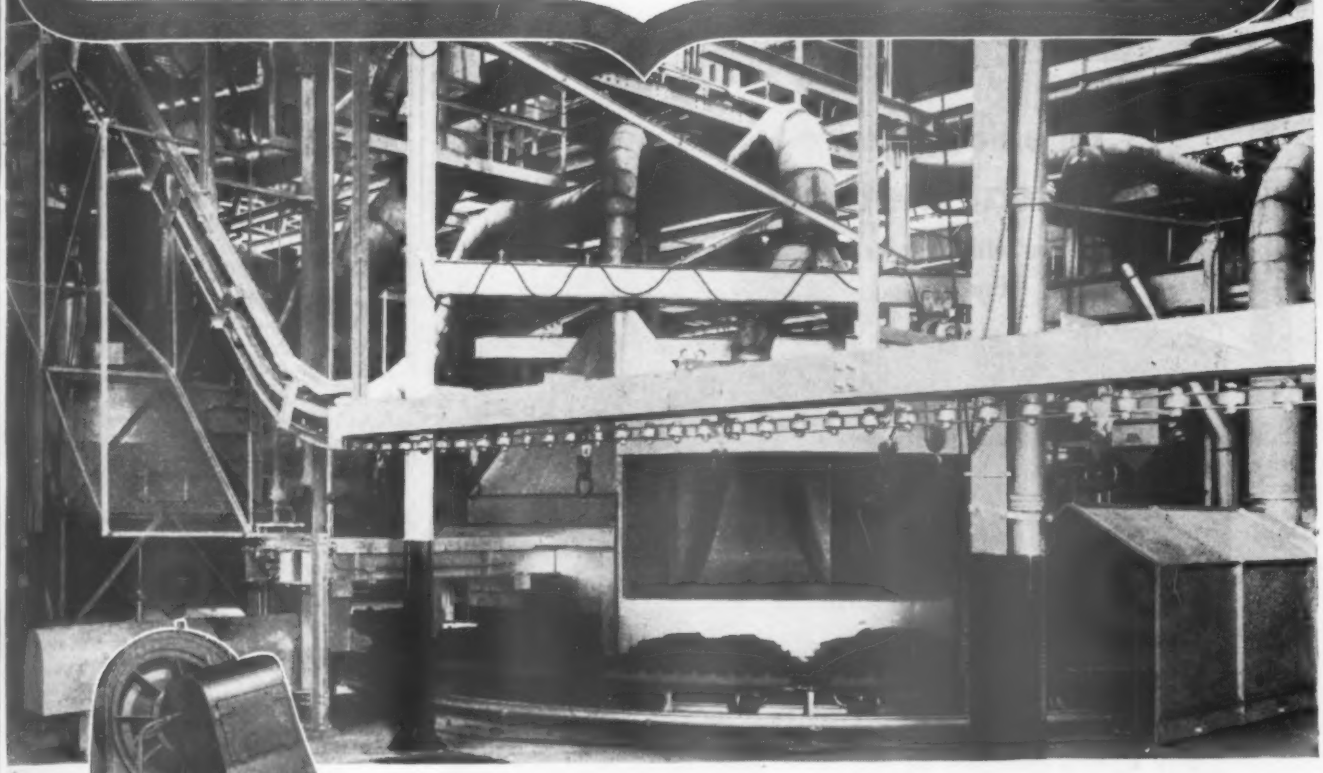
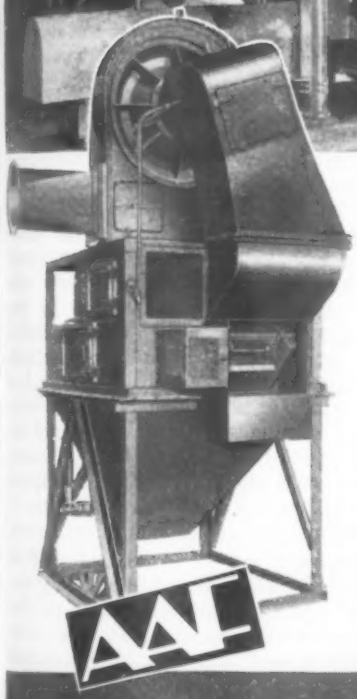
ROTO-CLONE*

for automotive foundry

DUST CONTROL





IN heavy duty shakeout service Roto-Clone has proved its value through years of successful performance. The Type W Roto-Clone, which can be seen in the background at the left of the picture above, exhausts the cope and drag shakeout and the casting removal station. This Roto-Clone dust control installation is typical of many such systems serving leading foundries throughout the country. For information on the Type W Roto-Clone (wet-type) for foundry service, ask for Bulletin No. 274A.

AMERICAN AIR FILTER COMPANY, INC.

266 Central Avenue **Louisville 8, Ky.**

In Canada: Darling Bros., Ltd., Montreal, P. Q.

** Registered Trade-Mark for a Dynamic Precipitator or Hydrostatic Baffle-Type Wet Collector.*

MANUFACTURER'S ASSOCIATION, INC. FOUNDRY EQUIPMENT

TYPE W ROTO-CLONE

(*Continued from page 226*)

old principles but requiring periodic re-examination to stimulate the interest of foundrymen, was applied re-studied and re-emphasized. The Naval Research Laboratory illustrated and emphasized the fundamental point that castings must be proportioned and gates positioned in a manner that compelled the metal that was farthest from the risers, to solidify first. After that, solidification must progress toward the riser where the hottest metal was located.

Gating, risering, padding, chilling, flowing off, tilting molds, pouring speeds, pouring temperatures, mold and core shrinkages, etc., represented some of the factors studied in the approach toward the objective of producing cast shapes that were as sound and solid as wrought shapes. Fig. 11 illustrates the application of some of these principles to the production of commercial castings. Foundrymen were stimulated by these activities which were also promoted by the Steel Founders Society of America. Dependability in castings was emphasized as worth the extra time and skill it took. The soundness of castings for war purposes was not left to chance, but was certified by non-destructive testing via x-ray, gamma ray, etc. The resulting experience has developed a large and expert following.

Cupola practice responded to the demand for larger tonnage and high quality by accommodating a number of readjustments. Conservation of material and manpower produced changes, some of which will remain permanently.

The foundryman soon learned that the extra capacity obtainable from their cupolas taxed the labor available to the point where production could not be maintained without help from mechanical devices. This led to the application of mechanical charging systems for cupolas. In most cases the charging bucket is filled in the stock yard by a traveling crane employing an electromagnet to handle the metal ingredients, which are weighed by a scale registering the amount within sight of the craneman's cab. Coke and limestone are cascaded onto the charge in the bucket from hoppers containing weighing or measuring devices. This operation is usually performed as a second step after the metal charge had been prepared.

A third operation employs an electric hoist which picks up the bucket and moves it into the cupola, where its contents are dropped. This procedure reduced the charging crews in foundry yards from numbers varying from 15 to 30 men, down to 3 or 4. In the course of this change, all of the heavy work of loading, weighing and conveying stock, and the hot work of hand charging which accompanied it, had been eliminated. This innovation operates in several modifications. Fig. 14 illustrates a typical installation. It was introduced in foundries melting more than 50 tons per day, but has become sufficiently attractive for foundries melting as little as 10 tons per day. It solved the problem of providing a sufficiently rapid charging rate to accommodate the greater melting rate accompanying the demand for increased production.

Refractories Are Improved

Metal removal at the spout presented a less difficult problem. Additional cranes, tramrails, motorized ladle buggies and ladles provided the handling capacity necessary to remove the additional tonnage melted. The maintenance of mixing and transfer ladles and similar equipment was facilitated by improvements in refractories which included the application of prepared shapes such as ladle bottoms which could be laid into place in a single piece. Similarly, slag skimming spouts for ladles and cupola spout linings were fitted in many cases with prepared refractory shapes which saved a great deal of time in maintaining or repairing this equipment.

Emphasis on the conservation of alloys and raw materials, including machine shop turnings and sheet metal clippings, led to reclamation practices, many of which will continue in the postwar period. The reclamation of alloys by segregating and classifying machine shop turnings became an important step in alloy conservation. It was claimed that only 10 per cent of the aircraft steel

(*Continued on page 230*)

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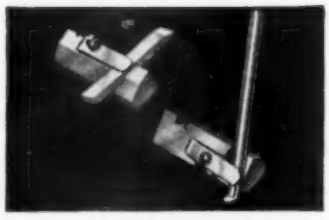

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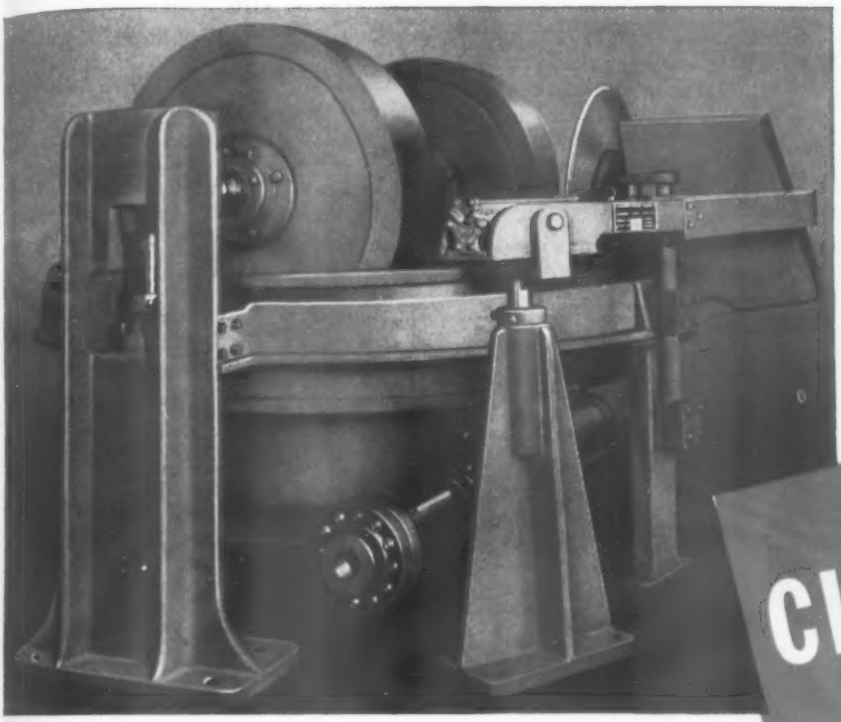

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Full information on request.

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FOUNDRY EQUIPMENT

CLEARFIELD
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(*Continued from page* 228)

originally melted, found its way into the working parts of a plane. Alternating famines in pig iron or scrap or alloys developed experience with a wide range of charging materials which demonstrated the adaptability to cupola melting of charging stock heretofore considered unsuitable. For example, the melting of briquetted cast iron borings and steel turnings from the machine shops taught the foundrymen the need for compressing these materials and limiting the size of the resulting compact within ranges that would assure him of good melting and product control. Bundles of steel clippings also had to possess a certain measure of density in order to melt well. In addition, it was found that the quantity of such scrap per charge that could be used might be limited by the blast pressure.

The briquetting procedures carried with them the need to recover oil that was introduced in the machine shops, mainly to eliminate the smoke nuisance which accompanied the use of this type of charging stock in the cupola. In some cases, the reclamation of alloys by their recovery through briquetted borings, caused a higher operating cost which at the time was justified in many cases through the need for conservation.

The installation of additional hot blast systems contributed also to a substantial saving in fuel, particularly where shops were melting more than 20 tons of iron per day. In some shops the hot blast systems were used to improve melting temperatures. While this may not have led to any economy in the use of fuel, it accomplished a more important objective in these shops through providing a hotter iron which contributed to the production of sound castings and better physical properties. Future developments in hot blast systems may improve their efficiency and reduce their bulk, thus providing an additional appeal to the smaller tonnage foundries in the problem of saving fuel or improving upon control.

Additional blast dehumidifying systems were installed principally to improve control and thus improve quality. Foundrymen are conscious of the fact that approximately 1½ tons of air are blown into the cupola for each 2 tons of iron melted, and this volume of air may contain 15 to 30 liters of water, which takes a toll of heat units out of the fuel bed and the metal charge. The increased loss in carbon, silicon and manganese attending the use of a humid blast could be eliminated by operating to a standardized humidity of the blast. Careful research work in the laboratory upon these subjects[2], when converted to commercial practice, offered foundrymen some measure of the influence of these factors upon the quality of the product or the economy of the process. These details of cupola operation, involving the study of the size and density of the metal and fuel charging stock, accompanied by better control over the temperature, pressure, volume and humidity of the blast, led to substantial improvements in practice which will lead the foundry industry to operate at new high standards in the future.

Select Better Raw Materials

The restricted availability of high grade charging stock often forced foundrymen to use desulphurizing and other purifying fluxes. In the postwar period many of the difficulties related to this problem will be eliminated through the selection of better raw materials.

The practice of duplexing by employing the electric furnace as a hot metal receiver and metal refiner gained further support. Castings requiring close control over their composition or properties lent themselves much more readily to this duplex type of melting. Weighing and measuring devices for closely controlled furnace and ladle contents were required. Common practice consisted of sampling the cupola metal by making preliminary analyses or chill tests and adjusting the metal in the electric furnace prior to pouring. With this type of control some of the metal for high strength castings of the crankshaft, gear, camshaft, and similar shapes could be easily prepared, alloyed up to a level necessary for the casting section and poured into molds resulting in a prod-

(*Continued on page* 232)

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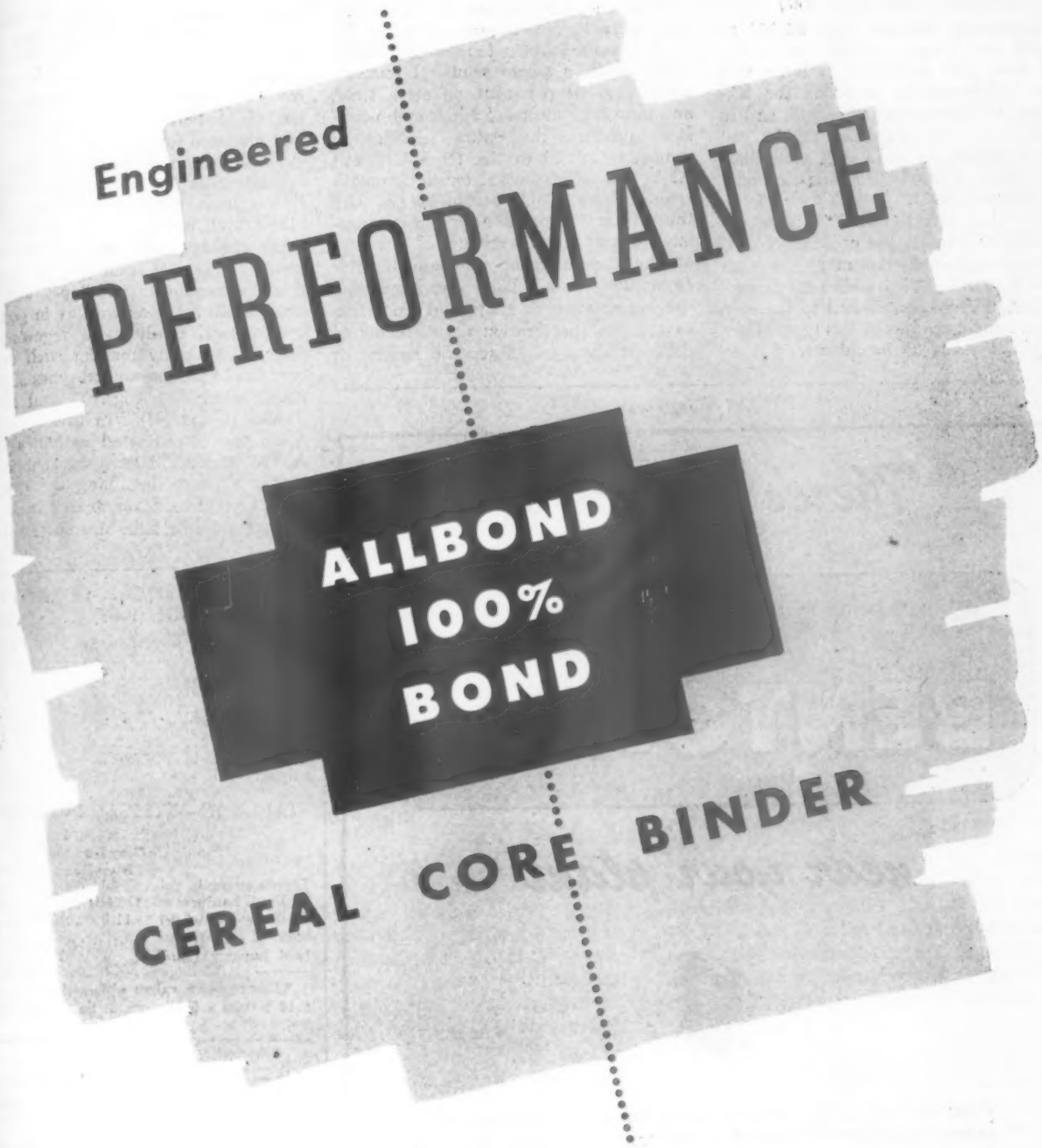

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(*Continued from page 230*)

uct possessing strengths from 60,000 to 100,000 psi. Cupola melted irons of this type were also produced in large volumes. They readily exceeded the 60,000 psi minimum tensile strength, and in special cases they exceeded 80,000 psi. Fig. 12 illustrates a difficult crankshaft made from a nickel-chromium-molybdenum alloyed metal.

The AFA and the ASTM have endeavored to simplify the problem of procurement and production of specification grade material. Two additional important factors have contributed to the ease of producing cast irons of this type. They are (1) alloys and (2) inoculants.

With the introduction of alloys and inoculants it has became possible for small tonnage jobbing foundries to standardize upon a single semisteel mixture, containing 40 per cent or more steel, and from it by means of alloys and inoculants produce the entire specification range of No. 20 to No. 60 ASTM and AFA cast irons, with tensile strength ranging from 20,000 to 60,000 psi. By this device it is possible for the foundryman to treat a metal mixture of this type at the cupola spout or upon transfer from the mixing ladle by employing varying amounts of alloys and inoculants to suit the specification requirements of different castings. Since the molds for these castings may not all be ready for pouring at one time the flexibility which the method provides enables the foundryman to treat his standardized mixture over a longer melting interval, in the course of which molds are completed and prepared for pouring.

In production foundries handling large quantities of similarly shaped castings, it has been possible with the help of alloys and inoculants to produce very small castings, such as individually cast piston rings, for example, to strength levels exceeding 65,000 psi and keep them machinable as well as in good microstructural condition as regards resistance to wear, by making such castings conform to predetermined types of graphite structure (see Figs. 13 and 15, and Tables II and III). In this connection, again the co-ordinated activities of the ASTM and AFA have assisted in providing a chart classifying the type and size of graphite flakes in cast iron. This map of graphite flake structures has been extremely useful in indicating to both producer and consumer the type of graphite desired.

Inoculation which had become common practice during the war, is certain to continue as a tool in the hands of the foundryman for eliminating heretofore unexplained variations in the quality of his product. The mechanism of inoculation has been traced to a reaction, which, when executed in its proper time and place, forces the crystallization of graphite in the stable system. Commercial inoculants usually possess a high order of graphitizing power which is supplied through the presence of graphitizing elements plus deoxidizers and degasifiers. Their important function of stabilizing the structure of the graphite leads to the production of a narrower and more dependable range of physical properties for metal of the same composition. Along with this improvement in structure there comes an improvement in toughness, machinability, wear resistance and strength. Inoculants containing alloys, such as nickel, chromium,

(*Continued on page 234*)

TABLE II—TYPICAL COMPOSITION OF ALLOY IRON (F-37) PISTON RINGS

	Per Cent
Total carbon	3.50
Silicon	2.78
Manganese	0.61
Nickel	0.92
Molybdenum	1.09
Chromium	0.20
Phosphorus	0.22
Sulphur	0.067

TABLE III—TYPICAL PROPERTIES

	Standard Gray Iron for Piston Rings	F-37
Tensile strength, psi	41,200	72,400
Rockwell hardness	101 (B)	30 (C)
Elastic modulus, psi	11.9×10^6	$17.-18. \times 10^6$
Mod. of rupture, psi	.....	117,000
Izod Impact* (in.-lb)	3	5

* Comparative values obtained from breaking 0.14 x 0.26 x 3 in. bars in an inch-pound Izod test machine.

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From any one of the locations shown below . . . you can get prompt shipments of Schundler Bentonite . . . a first quality foundry Bentonite.

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Chicago, Ill.	Foundry Supplies Co.
Chicago, Ill.	B. J. Steelman
Chicago, Ill.	Wehenn Abrasive Co.
Cincinnati, Ohio	Delhi Foundry Sand Co.
Coldwater, Mich.	The Foundries Materials Co.
Detroit, Mich.	The Foundries Materials Co.
Dallas, Texas	Barada & Page, Inc.
Edwardsville, Ill.	Midwest Foundry Supply Co.
Hammond, Ind.	The Foundries Materials Co.
Houston, Texas	Barada & Page, Inc.
Kansas City, Mo.	Barada & Page, Inc.
Long Island City, N.Y.	F. E. Schundler & Co., Inc.
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Milwaukee, Wis.	Thomas H. Gregg Co.
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New Orleans, La.	Barada & Page, Inc.
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Second G-E annealing group

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BENTON HARBOR MALLEABLE INDUSTRIES

Three additional G-E elevator electric furnaces to increase production of annealed malleable iron

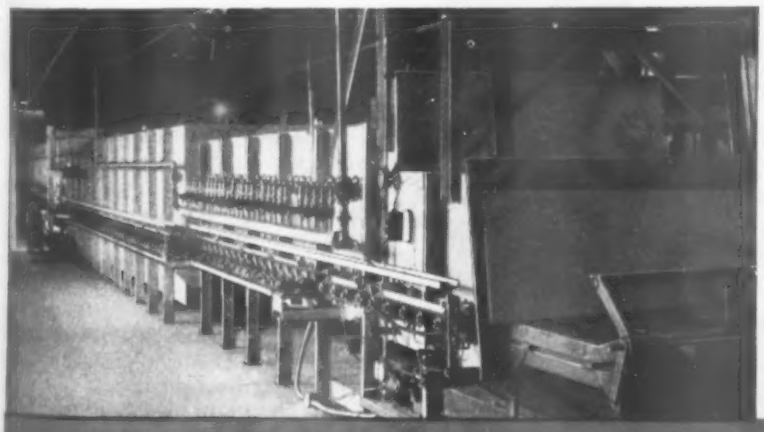
Small parts in cast-alloy containers being placed on car-loading platform preparatory to annealing in G-E elevator electric furnaces, newly added by Benton Harbor Malleable Industries, Inc., Benton Harbor, Mich.

G-E ROLLER-HEARTH ELECTRIC FURNACE

Where a condition in annealing production warrants a continuous furnace, a G-E roller-hearth electric furnace with automatic charging and discharging and automatic fine and temperature control is recommended.

PUT to the toughest test of all—actual production under wartime schedules—Benton Harbor's first group of G-E elevator electric furnaces turned out annealed malleable iron of such uniformly high quality and required so little operator attention that a second G-E annealing group having even greater capacity has been installed.

Consisting of one high-temperature and two low-temperature G-E elevator electric furnaces, group two provides completely automatic regulation of the heating and cooling cycle by means of program cooling control. The whole annealing process is completed in one series of operations, with the installation designed to eliminate any appreciable cooling and subsequent reheating of the high-temperature furnace during the cycle.



With a car-loading platform 4 ft. 3 in. wide, 3 ft 2 in. high, and 17 ft long, these G-E elevator electric furnaces normally load 16,000 lb (net) of castings per charge. While small castings are loaded in lightweight, cast-alloy containers, larger ones can be loaded directly on the platform, or the charge may consist of a mixed load.

If you would like detailed information on G-E equipment which will produce a uniformly high quality of annealing with a reduced cycle and with time, temperature, and cycle all automatically controlled, get in touch with our heating specialist in the nearest principal city. Or write to General Electric Company, Schenectady 5, N. Y.

Buy all the BONDS You Can—and *Keep All You Buy*

GENERAL ELECTRIC

(*Continued from page 232*)

manganese, molybdenum, titanium or zirconium in addition to silicon, calcium, aluminum and other deoxidizing or degasifying constituents are commercially available and are used for the specific improvements they confer beyond either their alloy contributing influence or their graphite structure control. Table III, taken from the *Alloy Cast Irons* handbook, second edition, published by the AFA, illustrates commercial type.

As mentioned above, the practice of inoculation has won a large following. Among the wear resisting castings a high percentage are treated with inoculants in the course of their production. In a survey of heat resisting applications of cast iron, mentioned later, over 40 per cent of the castings for this exacting service had been inoculated. In certain foundries the entire output is inoculated and the practice has become important particularly in shops producing automotive, diesel, compressor, hydraulic machinery, machine tool castings and similar wear resisting products.

Figs. 16 to 19 illustrate the difference in microstructure of untreated and inoculated machine tool cast irons. The powdery graphite structure may not extend entirely through the thickness of the section, but is prevalent at the working surface, often to a depth of 10 mm which exceeds the amount of metal removed from the casting by machining. In addition to wear-resisting structure, a good inoculant will promote uniformity in structure for irregular sections, and better machinability.

The demand for steel castings exceeded the capacity of steel foundries with the result that high strength cast irons were called upon to fill in where steel could not be procured. This stimulated progress in the production of high strength irons and the cupola production of those possessing tensile strength up to 100,000 psi, as already mentioned above. Usually strengths exceeding 60,000 psi were considered satisfactory, and nickel-molybdenum and nickel-chromium-molybdenum types fill most needs and lend themselves easiest to produce from the control standpoint.

In this connection a demand arose for cast iron to serve at elevated temperatures. For over 30 years the limiting temperature to which cast iron was permitted to work was 450 F. This temperature had been established by authoritative committees operating in behalf of the American Society of Mechanical Engineers. Under pressure of the war, the War Metallurgy Committee of the National Academy of Sciences conducted a survey of elevated temperature applications which revealed that for cast iron possessing a carbon equivalent of less than 3.9 no failures had occurred in service above 450 F. The carbon equivalent was defined as C + 1/3 Si + 1/3 P = carbon equivalent. The work led to the preparation of a preliminary specification for cast iron of this type. This work was executed through a joint committee of AFA and ASTM.

Iron Shows High Strength

The preliminary specification provides for gray iron pressure containing castings suitable for temperatures up to 650 F. Details may be found in the ASTM publications. One item in the specification requires that the cast iron possess a strength exceeding 40,000 psi. An example of the progress that has been made in this direction occurs in producing paper mill dryer roll castings weighing many tons each. Tensile strengths exceeding 60,000 psi in Type C (1 in. diameter) bars, and 45,000 psi in specimens cut from the top and bottom walls of the roll, represent properties obtainable in the high-test nickel-molybdenum alloyed cast iron that is used.

Additional progress occurred with the heat resisting and austenitic types of alloys containing chromium, nickel, copper and molybdenum in substantial amounts. Among the low alloy irons, chromium additions up to 1 or 2 per cent accompanied by nickel, copper and molybdenum, have been developed which possess a much greater resistance to scaling and deterioration under conditions such as prevail in the furnaces of oil stills and power plants. Austenitic irons of the Ni-Resist type were extensively used for both corrosion resistance and heat resistance. A large quantity was

(*Concluded on page 236*)

MADE OF ASBESTOS
They can't corrode!
Transite Core Plates have all these important advantages:
Light Weight—Easier to handle, permits heavier loads.
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FROM THE WORLD'S LARGEST SANDSTONE QUARRIES

. . . . . comes this nearly pure Silica stone, which can be readily split or sawed to meet your foundry requirements.

A rapidly increasing number of foundries in the United States and Canada are now using Buckeye Silica Firestone for lining and patching the melting zone in cupolas.

Among the many outstanding advantages of this natural refractory material are its low first cost, its ease of application, and its high resistance to heat and abrasion.

Complete details regarding approved methods of using this natural sandstone will be determined by our service organization. We feel it will pay you to investigate Buckeye Silica Firestone. . . . . .

The Cleveland Quarries Co.

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(*Concluded from page 234*)

employed as a ball joint member in aircraft exhaust manifold assemblies (Fig. 6) and somewhat similar uses were made in less spectacular applications requiring resistance to heat or corrosion. Heat and abrasion resisting cast irons of the type containing 28 to 30 per cent chromium and 1 to 3 per cent nickel, along with small amounts of molybdenum, also found employment in heat resisting applications as well as in services requiring the high resistance to abrasion.

Among the abrasion resisting compositions, the low alloyed chromium and chromium-nickel types, along with the special Ni-Hard type, found an increasing usage as liners for grinding mills pulverizing the minerals whose end products were essential to the conduct of the war. These alloyed irons, which could deliver from two to four times the performance of unalloyed types, had to take their turn in the matter of availability which depended upon the government's decision as to whether the alloys were sufficiently abundant to be used for the purpose intended or not. In contrast, 35 per cent nickel cast irons of low expansivity were promptly allocated the alloys they required for such essential purposes as parts for instruments, machine tools and precision mechanisms requiring dimensional stability throughout changes in the temperature at which they operated.

Very little change occurred in established practices for heat treating cast irons. Since these practices usually require time and manpower in their execution it was in general less difficult to produce the properties desired in the as-cast condition. The more leisurely schedule at which peacetime operations move may lead toward a wider application of heat treating practice in developing special properties of cast iron where such a procedure produced them more economically.

I might explain that some of the photographs used to illustrate the principle of the practice described, actually picture a scene in a steel or malleable or bronze foundry. In conclusion, I would like to express an appreciation to my associates in the International Nickel Co. and to my friends in the industry for their contributions to the substance of this paper.

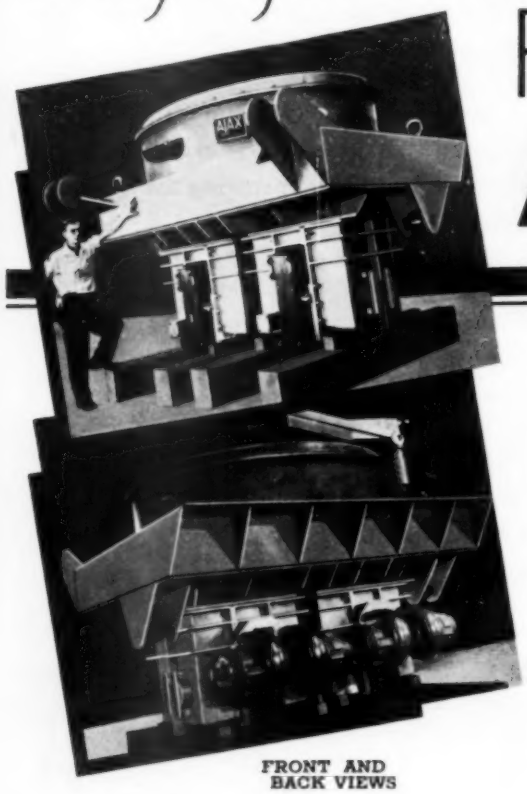
REFERENCES

1. Blackwood and Perkins, *Transactions*, AFA, 1944, Vol. 52, p. 273.
2. "Trends in Iron Foundry Metallurgy," J. S. Vanick, *Metal Progress*, January, 1944, p. 83.

SOURCES OF ILLUSTRATIONS

Figs. 1, 4—Chapman Valve Mfg. Co., Indian Orchard, Mass.
Figs. 2, 3, 14—Belle City Malleable Iron Co., Racine, Wis.
Fig. 5—Mir-O-Col Alloy Co., Los Angeles.
Fig 6—Ryan Aeronautical Corp., San Diego, Calif.
Fig. 7—Motor Wheel Corp., Lansing, Mich.
Figs. 8, 16, 17, 18, 19—International Nickel Co. Inc., New York.
Figs. 9, 10—Lufkin Foundry & Machine Co., Lufkin, Tex.
Fig. 11—Long Beach Brass Foundry Co., Long Beach, Calif.
Fig. 12—Fairbanks, Morse & Co., Beloit, Wis.
Figs. 13, 15—Koppers Co., American Hammered Piston Ring Division Baltimore.

Low Frequency INDUCTION MELTING FURNACE *by* AJAX



FRONT AND BACK VIEWS

THIS unit (the largest of its kind ever made for melting aluminum alloys) is powered with 500 kilowatt three-phase 60 cycles alternating current, melts over 2500 pounds of aluminum alloy per hour and allows to cast ingots up to 6000 pounds individual weight. Tilting is exactly around the pouring spout and casting speed is adjusted within close limits by hydraulic rams with sensitive pump control.

Temperature, of course, is also automatically regulated and there is no chance for overheating the bath at any time during the melting cycle.

● Ajax Tama-Wyatt Induction Furnaces are made in a wide range of sizes to meet the demand for large volume or small special lots of aluminum alloy ingots. Ajax Tama-Wyatt Furnaces can be operated continuously, without frequent interruptions previously necessitated for reconditioning melting channels.

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AJAX ELECTROTHERMIC CORP., Ajax Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC., The Ajax-Multiplex Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting

Readers' Comment

What Are We Waiting For?

TO THE EDITORS:

Most of the advertising in favor of cast iron appears in the pages of the technical press where it is not seen by the general public. During the past few years everyone has seen the effect of propaganda. Would it not be possible for the foundry industry to take advantage of this powerful force to broadcast information through newspapers and the radio? Everyone knows what coffee is and what it tastes like. And yet the coffee people spend a whole lot of money in advertising what a wonderful drink it is.

See what the meat industry did all through the past few years when we could not get meat even if we had the price and the points. The meat men spent more than they ever did before to keep people meat conscious. Probably they were afraid that the substitutes we were obliged to eat might become a habit with us and we would forget the taste and the smell of meat. See what the glass industry does in telling the public how well glass preserves food.

Does that discourage the tin can makers? Not at all. They come out bravely with the claim that when it comes to storing food, nothing equals a tin can.

Everyone knows what an automobile is and what it will do. And yet in spite of the fact that if not a dollar should be spent in advertising in the next few years there is not the slightest doubt that every auto manufacturer would have an immediate sale for anything that could run on four wheels, or in some instances on three. Do the automobile people stop advertising? Most emphatically they do not. They keep right on spending millions in keeping a picture of their past and future product before the public. If an out of the ordinary feature of any kind can be hooked onto the auto, the news is splashed over the pages of every newspaper, and blared from every radio broadcasting station in the land.

Think of the vast amount of interest that might be stirred up by a brief foundry message delivered over the radio every week. Suppose the pig iron people add a few cents per ton to their product, and the steelmakers do the same. Then they could spend the whole amount in good, sound ways, letting the general public know they are in existence, and engaged in the production of castings, still superior in many ways to many modern substitutes.

ARTHUR W. GIBBY
Gibby Press, 96 Condor Street, East Boston, Mass.

Casting Shown Is Steel

TO THE EDITORS:

In the October issue of THE FOUNDRY we have read with interest the article describing the United States Navy Yard foundry at Philadelphia. We shall appreciate further information on one item in particular. Photograph 3 shows one casting made with high pouring head and no riser, also the same or duplicate casting with normal head and several risers. The caption does not state whether the casting is bronze or steel. Size of the risers and style of padding suggests a steel casting. Which is it? If the same job were to be cast in bronze, which of the two methods would you prefer, and why?

C. H. STOKESBURY
Treasurer

Derby Castings Co.
Seymour, Conn.

Editors' Note: When the experimental work is finished it is hoped that a description will be released by the Navy Department for incorporation in foundry literature and for the general information of men engaged in the foundry industry. In the meantime THE FOUNDRY will welcome comment from readers who have had experience in this particular field. The illustration shows a steel casting, but work also has been done on bronze and iron.

A silica foundry sand deposit has been opened in the Pacific Northwest, the first in the history of the Northwest. Deposits near Eugene, Oreg., are yielding 100 tons of sand daily.

New Representative

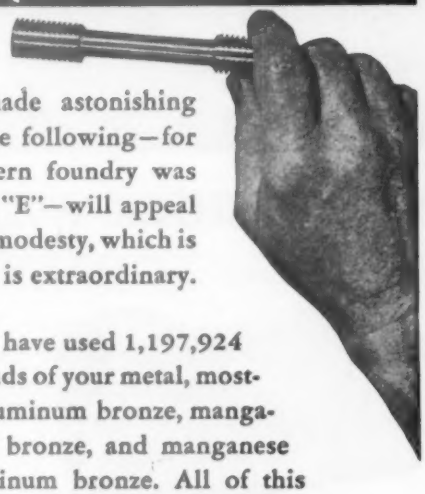
Allegheny Ludlum Steel Corp., Brackenridge, Pa., has opened a new office at 306 Thompson Bldg., Tulsa, Okla., where sales and engineering services will be offered for the territory comprising Oklahoma, Texas panhandle and sections of Kansas, Missouri and Arkansas. Walter T. Lewis has been appointed district representative.

Acquires Foundry

Kinney Iron Works, Los Angeles, one of the oldest and largest gray iron foundries in southern California, has been acquired by Kinner Motors Inc., Los Angeles, which will operate it as a wholly-owned subsidiary under the direction of Edward I'Anson, former vice president and general manager of the Menasco Mfg. Co., engine manufacturer, and at one time identified with the gray iron foundry industry in the East. Name of Kinner Motors is to be changed to Gladden Products Corp., with John Gladden as president.

Chain Belt Co., Milwaukee, has been awarded the Army-Navy "E" for the fifth time. The company's original flag was awarded in September, 1942.

REJECTS BELOW 1/4 OF 1%!
A Highly Expert Foundryman reports to AJAX



Nonferrous founders have made astonishing records in the last 3 years. The following—for which this representative eastern foundry was thrice awarded the Army-Navy "E"—will appeal to all foundrymen because of its modesty, which is typical, though the achievement is extraordinary.

Send for booklet
"INGOT METALS OF TODAY"

16 STANDARD INGOT METALS BY AJAX

Ajax Tombasil
Ajax Plastic Bronze
Ajax Anti-Acid Bronze
Ajax Phosphor Bronze
Ajax Red Brass Ingots
Ajax Manganese Bronze
Ajax High-Tensile Manganese Bronze
Ajax Golden Glow Yellow Brass
Ajax Nickel-Copper 50-50%
Ajax-Hamilton Gear Bronze
Ajax Manganese Copper
Ajax Aluminum Alloys
Ajax Phosphor Copper
Ajax Silicon Copper
Ajax Nickel Alloys
Ajax Phosphor Tin.

NOTE
*"Proper Melting Decreases Foundry Losses," contains interesting data. Also, the booklet, "Nonferrous Ingot Metals of Today." Write for both of these. They are free.

"We have used 1,197,924 pounds of your metal, mostly aluminum bronze, manganese bronze, and manganese aluminum bronze. All of this has gone into Army and Navy material. It has been subjected to severe tests, both chemical and physical, in castings weighing from ½ to 750 lb. each. A lot of this had to stand a hydrostatic test of 7,700 lb. On this production, we feel it safe to say that our rejects have been less than ¼ of 1% due first, to your fine quality of metal, and second, to our good luck."

We are always gratified to receive letters of this character, and take pleasure in placing it among many similar ones received during our 65 years in the metal business.

AJAX NON-FERROUS INGOT METALS AND ALLOYS FOR FOUNDRIES
ESTABLISHED 1880 METAL COMPANY • PHILADELPHIA
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Induction Furnaces for Melting
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., INC. The Ajax-Huttgren Electric Salt Bath Furnace
AJAX ENGINEERING CORP., Ajax-Yoma-Wyatt Aluminum Melting Induction Furnaces
ASSOCIATE COMPANIES

Conco FOUNDRY CRANES

● **CONCO type DM Overhead Electric Crane moves materials swiftly, economically on a foundry floor. Write us for information on various CONCO Cranes, Hoists and Trolleys recommended for, and proved in, *foundry installations*. Our long experience enables us to recommend the right equipment, in the right size, for the right job.**

WRITE FOR INFORMATION ON THESE UNITS

JIB CRANE

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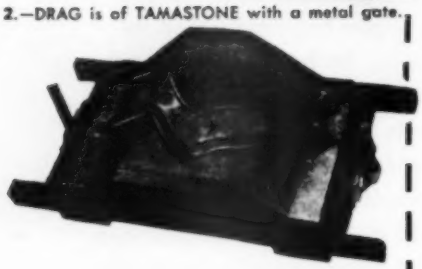
1.—COPE is entirely made of TAMASTONE.

2.—DRAG is of TAMASTONE with a metal gate.



Note irregular shape of manganese casting.

3.—14" x 24" SLIP FLASK is designed to conform with extremely irregular parting line and manganese casting. Cope 11" high with 6" offset and 4" drag.

TAMASTONE

makes possible

500% INCREASE

at Hunter Foundry Co., Chicago

With original equipment, gated pattern and hard match only 10 to 12 molds per day were possible. Through the use of TAMASTONE Pattern Compound (100 lbs.) the job is converted to separate cope (A) and drag (B) patterns and production is now 60 molds per day. This new method enables the foundry to draw pattern from the sand as offset parting, eliminating the amount of sand to be lifted in the cope. Equipment is gated for pouring manganese.

Savings from 300 to 500% are also possible in match plate production! Write for literature today!

No. 90 IRON OXIDE

Used in Grey Iron and Steel Foundries. Add to regular core sand mix. Prevents core burning, veining, penetration. Prevents core sand failure. Improves castings, reduces cleaning cost! Inexpensive!

Write for sample!

TAMMS SILICA CO.

228 N. La Salle St. • Chicago 1, Illinois

FOUNDRIES OF THE FUTURE

(*Continued from page* 87)

self with how it's going to be done, but with what you want to do. Then call in the experts. There must then be agreement between you and the experts, and when you are mutually agreed and are satisfied that the proposed system is sound, check back each item to make certain that the proposed changes will do all of the things expected. Once agreed on a system and what you think it will do, then visit a few foundries which are operating similar equipment and compare data.

Bear in mind that it is difficult and costly to rectify mistakes. Further, poorly designed systems fail to reduce costs. Because of this, the need for a sensible approach and the development of sensible curbs becomes evident. Company officials have to think in terms of amortizing the cost of mechanization; therefore, if production and quality requirements are to be met at lower costs, the job of mechanization must be properly engineered from the start.

Most of the mechanized foundries I have seen have been properly engineered and the systems are doing a magnificent job. But of all the mechanized foundries I have seen, it is apparent that the most popular type in the East is that with adequate provisions for mold storage necessitated by intermittent pouring. Possibly the jobbing nature of the work done in our eastern foundries is responsible for this trend.

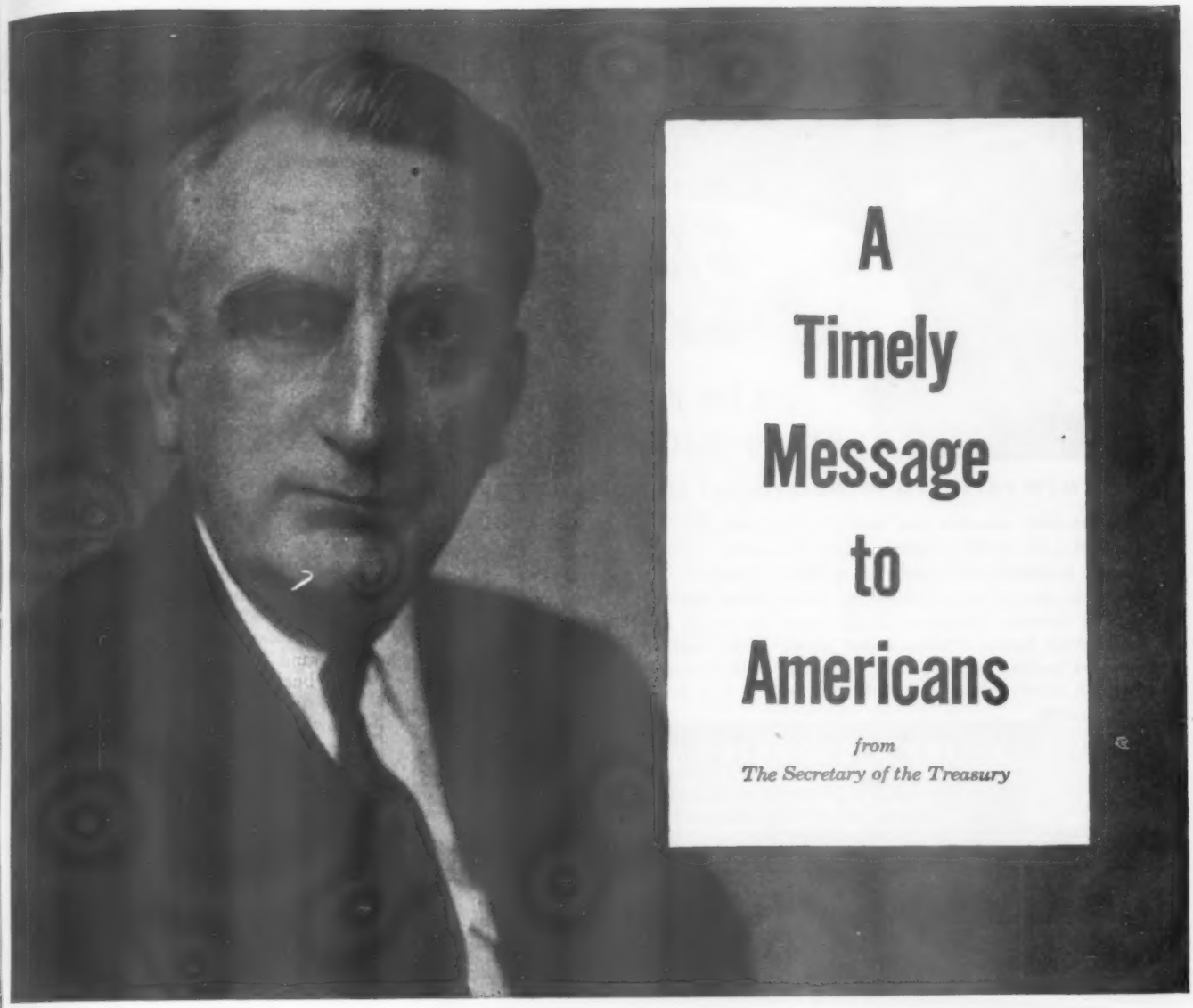
Can Do a Real Job

The foundry with a continuous melting and pouring program, however, has the opportunity to do a real job with tremendous savings over batch operations. This type of mechanized foundry requires the best in planning, scheduling, and supervision. The experts tell us that 2½ tons per hour melt of gray iron is about the minimum economical tonnage to be considered for continuous cupola operations. As for nonferrous metals, the controlling factor may be a combination of size of castings and the ability to supply the tonnage required by the use of a sufficiently large battery of furnaces. With an adequate battery of furnaces, a close approach to continuous metal can be obtained.

It has been estimated that a typical foundry can be mechanized for sand and mold handling at a cost of from $2500 to $5000 per molding machine or unit served. And it is also estimated that maintenance, power, interest, depreciation and operation service will average on typical installations from 75 cents to $1.50 per ton of castings produced on the basis of a 300-day single-shift year.

The accompanying illustrations emphasize the need for "cutting the cloth" to the pattern. No two foundries are alike. Even though they make the same castings, there are variables due to lay-

(*Continued on page* 240)



A Timely Message to Americans

from
The Secretary of the Treasury

America has much to be thankful for.

Abroad we have overcome enemies whose strength not long ago sent a shudder of fear throughout the world.

At home we have checked an enemy that would have impaired our economy and our American way of life. That enemy was inflation—runaway prices.

The credit for this achievement, like the credit for military victory, belongs to the people.

You—the individual American citizen—have kept our economy strong in the face of the greatest inflationary threat this nation ever faced.

You did it by simple, everyday acts of good citizenship.

You put, on the average, nearly one-fourth of your income into War Bonds and other savings. The 85,000,000 owners of War Bonds not only helped pay the costs of war, but also contributed greatly to a stable, prosperous postwar nation.

You, the individual American citizen, also helped by cooperation with rationing, price and wage controls, by exercising restraint in your buying and by accepting high wartime taxes.

All those things relieved the pressure on prices.

THE TASK AHEAD

We now set our faces toward this future: a prosperous, stable postwar America—an America with jobs and an opportunity for all.

To achieve this we must steer a firm course between an inflationary price rise such as followed World War I and a deflation that might mean prolonged unemployment. Prices rose more sharply after the last war than they did during the conflict and paved the way for the depression that followed—a depression which meant unemployment, business failures and farm foreclosures for many.

Today *you* can help steer our course toward a prosperous America:

—by buying all the Victory Bonds you can afford *and by holding on to the War Bonds you now have*

—by cooperating with such price, rationing and other controls as may be necessary for a while longer

—by continuing to exercise patience and good sense with high faith in our future.

The challenge to America of switching from war to peace with a minimum of clashing gears is a big one.

But it is a small one compared to the tasks this nation has accomplished since Sunday, December 7, 1941.

Fred M. Vinson
Secretary of the Treasury

A Government message prepared by the War Advertising Council and contributed by this magazine in cooperation with the Magazine Publishers of America.

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Handles many important jobs faster, better, for less. A.C. or D.C. current. Electrically driven hydraulic pump connected to cylinder and ram, in turn connected to bucket lips by trunnion; movement of ram opens and closes bucket. When bucket closes, pressure reaches maximum and oil passes through relief valve; no overloading of motor, no damage to bucket. No sheaves, cables, chains or other trouble-causing "gadgets"; closing mechanism runs in oil. Bucket opens by gravity; no power waste in closing. No headroom lost for closing. Simply hook on and plug in; 10 minutes to hook or unhook. Write today for a copy of our new, well illustrated BULLETIN.

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Designers and Builders of All Types and Capacities of Electric Overhead Traveling Cranes and Hoists and Electric Revolving Cranes

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INSURES

MORE MELTS PER DAY

Biggest advantage of the Iler Crucible Draw Furnace is its exclusive Split-Body design, shown in the illustration. Note how easily crucibles may be handled, saving time and labor. The open-side shank (provided with furnace) permits pouring direct from crucible, no over-heating nor transfer of metals is necessary. No tongs nor overhead handling equipment required. Heat is trapped in upper portion of furnace saving time and fuel in reheating. Furnace rests on floor; does not require pit.

An automatic air lift opens and closes furnace at the touch of a valve, conserving heat and speeding up removal and replacement of crucibles. For speed and economy in all non-ferrous foundry operations, get the facts on the Iler Crucible Draw Furnace. Available in sizes 50, 70, 90, 125 to accommodate crucibles of corresponding number. Burner for gas or oil operation optional.

Send for complete information today.

THE FEN MACHINE CO.
1350 BABBITT ROAD
CLEVELAND 17, OHIO

ILER
CRUCIBLE
DRAW FURNACES

(Continued from page 238)

out, operating methods, technical ideas of the operating officials, the type flasks and sand used—to mention only a few—which make standardization of mechanical procedures impossible. It is for this reason that systems should be designed to fit the peculiarities as well as the needs of foundries.

Fig. 1 shows a well engineered small foundry job. This system refutes the argument that mechanical aids are for high activity casting only. Although this system will serve a small foundry, it is important to note that the mechanization has been built around jobbing as well as production orders. This arrangement shows the reasons for not only high production, but also greater flexibility of product.

A transfer bucket will be used to take molds to a central shakeout. After shakeout, the castings will be taken to the finishing room. Note that the sand handling system will serve the entire foundry. The mixer prepares 5 tons of sand per hour. The total cost will approximate $20,000.

The most common method of conveying sand is by means of belt conveyors and bucket elevators. For small foundries, a bucket arrangement such as shown in Figs. 2 and 3 is often much cheaper in first cost and more easily maintained than the bucket elevator and conveyor belt. The unit is controlled by means of a five-button pendant attached to the hoist.

Foundry Lacks Head Room

Fig. 4 shows the layout for a jobbing shop making nonferrous castings. The system serves eight molding stations. Here, as in the previously described foundry, shovel hoppers are employed. It was necessary to use shovel hoppers and the buggy method of sand conveying because of lack of sufficient head room. For a belt conveyor sand distributing system, approximately 16 ft in height is required, whereas with this system, headroom of 11 ft is adequate.

This foundry is also equipped with a crane. It is interesting to note the method used in permitting uninterrupted crane travel without interferring with the sand handling system. Note the detail on the left; the crane has adequate space. Also note the increased mold storage capacity.

In this case, as in Fig. 1, labor for sand preparation and delivery is one-man. Sand storage is up to 50 tons and the system can prepare 10 tons of sand per hour.

The total cost of this system is approximately $30,000.

The layout shown in Fig. 8 is of a small brass foundry which installed mechanization for ten molder units. Mechanized as it is, this foundry produces more than formerly was possible with 15 molders. A 40-ton sand storage bin provides ample sand capacity. Cleaned sand is delivered from this bin in 1400-lb. batches to the mixer. Batches are measured automatically and accu-

(Continued on page 242)

OF GREAT INTEREST FROM A FREIGHT-RATE STANDPOINT . . .

OF GREAT INTEREST FROM A FREIGHT-RATE STANDPOINT . . . .

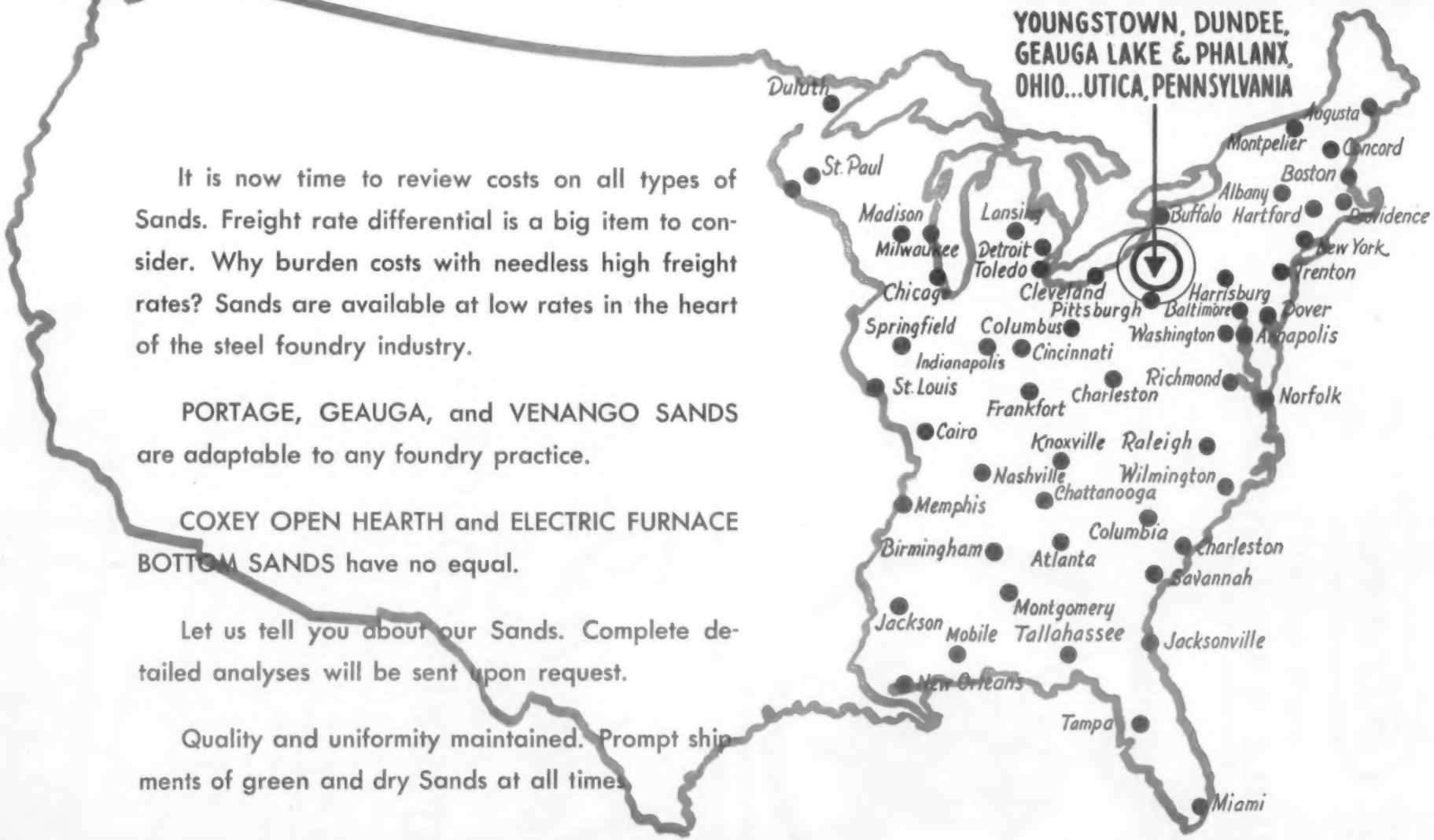
It is now time to review costs on all types of Sands. Freight rate differential is a big item to consider. Why burden costs with needless high freight rates? Sands are available at low rates in the heart of the steel foundry industry.

PORTAGE, GEAUGA, and VENANGO SANDS are adaptable to any foundry practice.

COXEY OPEN HEARTH and ELECTRIC FURNACE BOTTOM SANDS have no equal.

Let us tell you about our Sands. Complete detailed analyses will be sent upon request.

Quality and uniformity maintained. Prompt shipments of green and dry Sands at all times.



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In the heart of the steel Foundry Industry

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FLEXIBLE SHAFTS

FORTIETH YEAR 1945

HIGH QUALITY
FLEXIBLE SHAFT MACHINES
ONE HUNDRED TWENTY-FIVE TYPES AND SIZES, 1/8 TO 3 H. P.

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THREE SPEEDS OR SINGLE SPEED
MORE THAN THREE HUNDRED ATTACHMENTS.

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FOUNDRY ENGINEERS SINCE 1919

A. A. WICKLAND & CO.
ENGINEERING BUILDING • CHICAGO (6)
TELEPHONE DEARBORN 9344

(*Continued from page 240*)

rately. In this foundry, shovel hoppers are also used. The experts tell us that it is almost as fast as the gate type when Albany sand, which is a sand of low flowability, is used.

Each molder makes from 30 to 40 molds per hour. Since the castings are symmetrical the pattern serves both the cope and the drag.

The outer part of the conveyor is equipped with ten clamping devices, as seen in Fig. 6, which eliminate the hand method of shifting weights from one lot of poured molds to another. The number, ten, was selected because this is the number of molds that may be poured from one ladle of metal. When the mold is poured, a single pull upon the lever releases the plate and lifts it out of the way. These plates cost $15 each.

Shakeout takes place at the end of each roller conveyor. This arrangement is, in my opinion, a disadvantage. First, the castings are not at a central point for easy transportation to the cleaning room. Extra handling is called for. Secondly, this system provides a type of shakeout arrangement that makes dust control difficult and expensive. Dust collection is unsatisfactory because there is no hooding and, furthermore, a system of dampers must be resorted to in order that sufficient air flow be provided to control the dust dispersion. Some foundrymen, however, have indicated the need for quick shakeout and have stated that metal conditions should have a bearing on the type shakeout system established.

Insure Positive Dust Control

I am a believer in centralized shakeout, because control of the dust can be made more positive. Whenever possible, the exhaust air should be withdrawn through an overhead hood which covers the entire grate and is located as close to the grate as possible, as indicated in Fig. 9. In cases where it is impossible to install overhead hoods without seriously interfering with the operation, side hoods should be used.

The advantages of a central shakeout system are many, such as: (a) cleaner castings, because of the economical use of a vibrating mechanism; (b) dust is controlled with proper hooding and efficient exhaust; (c) greater sand recovery; (d) castings are all at a central point for easy transfer to the cleaning room and (e) central shakeout costs less from an investment standpoint and is cheaper to operate.

Fig. 7 shows the melting department, which is equipped with trolley system. Metal is melted in a battery of six tilting type furnaces with a capacity of 600 lb each per hour.

The total cost of the complete handling system was $40,000.

One point that should be emphasized in all of these installations concerns housekeeping. During these times of labor scarcity, clean-up labor is hard to get. Housekeeping and clean-up tasks are greatly simplified through mechani-

(*Continued on page 244*)

Quality in any product is the result of care in planning, preparation, raw materials selection and production control . . . it is not achieved by accident.

Years of effort and ripe experience, large investments in the most modern control equipment, and the skills of many experts, are all combined to produce today's high quality Smelters' Aluminum Alloys.

For freedom from oxide inclusion; for controlled grain structure; for uniformity; for complete satisfaction in any casting application; specify our laboratory-controlled Aluminum Alloy Ingot. Its quality and dependability have been planned.

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Instantly
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This instantaneous direct reading air velocity meter measures air speed in feet per minute. There are no calculations, no timing, no conversion tables; its use is so simple that anyone can take accurate measurements with the Velometer. Extension jets permit correct readings in many locations that would be difficult or impossible to reach with other means of measurement.

Keep exhaust equipment working efficiently by regular checks for draft, leaks, blower operations, etc., with the Alnor Velometer. You can get accurate information on performance with a few minutes' inspection at regular intervals.

The Velometer is made in several standard ranges from 20 fpm to 6000 fpm and up to 3 inches static or total pressure. Special ranges available as low as 10 fpm and up to 25000 fpm velocity and 20 inches pressure. Write for Velometer bulletins.

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Production Investigate
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In wide scope and high efficiency this equipment emphasizes the ability of the Lanly organization to meet your needs for standard and special equipment to meet the special needs of post war manufacturing.

We also do
Oven Remodeling and Rebuilding.

THE LANLY COMPANY
750 Prospect Ave. CLEVELAND, OHIO

(*Continued from page* 242)

zation, and the amount of time required to keep the foundry in the best possible condition is reduced to a minimum.

All of the three systems just described were designed for small foundries and are capable of increasing production from 50 to 200 per cent. The percentage increase, however, depends entirely upon the conditions prevailing before mechanization, the type and volume of work produced and, most important of all, supervision.

An ideal system for both small and large foundries pouring small tonnages is depicted in Fig. 10. The system also can be used for high tonnages, but, in my opinion, it is particularly adaptable to the foundry with large mold production but small tonnage. The roller conveyor system serving the molders runs to an overhead monorail conveyor system from which are suspended trays large enough to hold several molds.

Mold carriers suspended from overhead monorails are economical to install, they are flexible and also have the advantage of leaving the floor clear of obstructions.

Conveyor System Works Easily

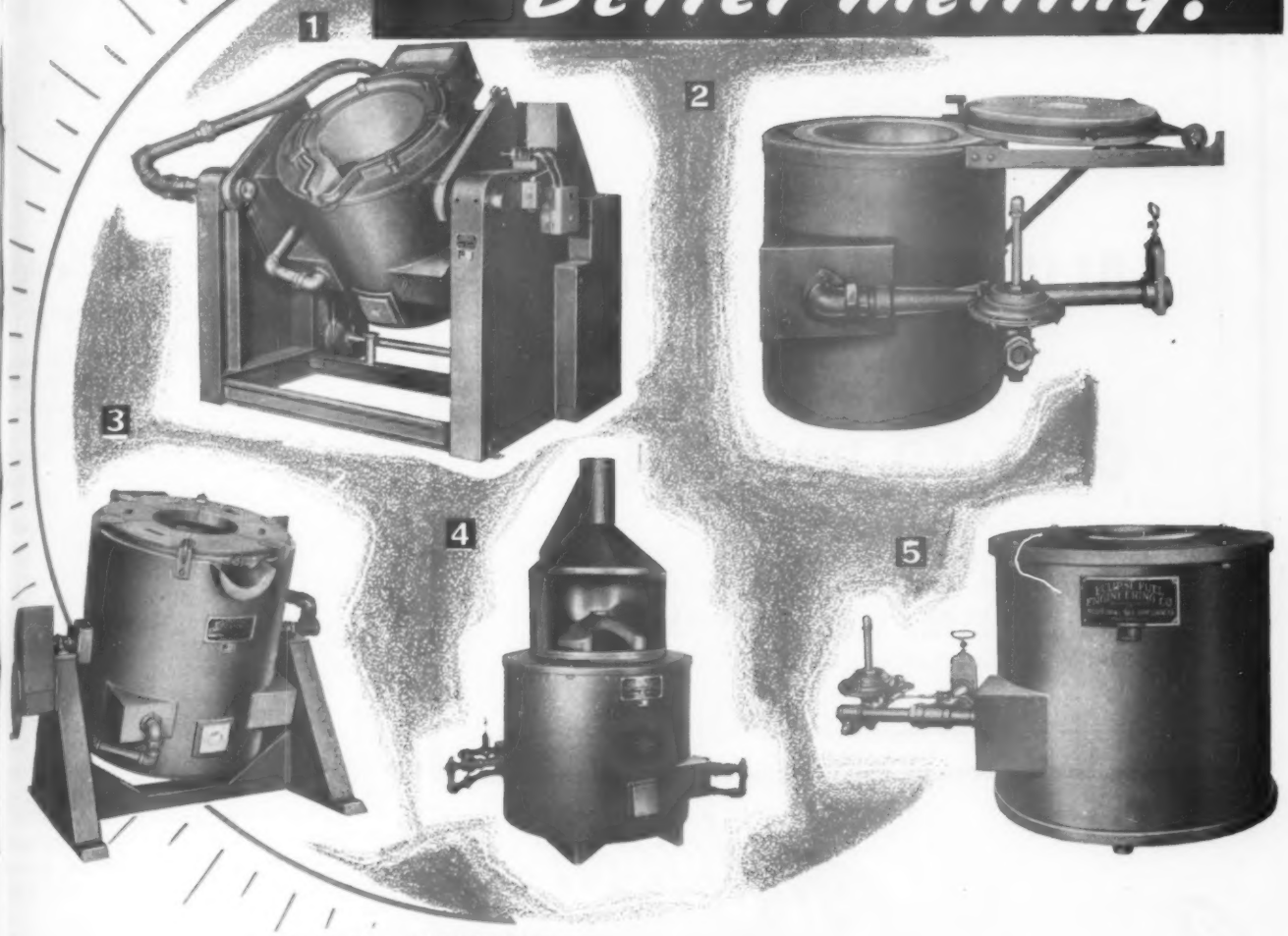
Molds are transferred by hand from the roller conveyor system to the trays. Each tray is equipped with rollers to match the conveyor system so that the straddle board with the molds can be easily moved. The laborer who does this work also returns the bottom boards and flasks to the molders on the tray's return trip. The conveyor system operates easily and permits moving the molds to be poured to a central pouring station, thence to a central shakeout. Further, this system permits the making up of a train of trays containing molds for a particular melt. These trays can be stored by utilizing a switch arrangement which, incidentally, this particular company does not have. But I mention the idea merely to show that molds can be stored on trays until such time as the melt for them is ready.

The trays, I would estimate, occupy about 50 to 60 per cent of the total trolley path. The ease of movement is another feature which the men like. The laborer taking off from the roller conveyor sees to it that the trays are moved to the pouring zone. After pouring, the pourers push the trays to the shakeout zone, shown in Fig. 5, and after shaking out, the worker at this station moves the empty trays with bottom boards and flasks along the conveyor system to the laborer who first started the trays on their travel.

At this particular plant, a partition has been built through the trolley conveyor system. This is an excellent idea since it separates the pouring and shakeout from the rest of the foundry. An interesting point is that a system like this lends itself very well to future electrification. The hand-propelled method is a little more flexible of the two for small foundry use. However, if production is large, power travel is more efficient. A

(*Concluded on page* 246)

for Quicker Better Melting!



McKee Eclipse

GAS-FIRED CRUCIBLE MELTING FURNACES

Select from the wide variety of specially-designed McKee-Eclipse Melting Furnaces. Five representative models shown here.

1 Motorized nose-pour melting furnace, equipped with cast iron pot, for aluminum melting.

2 Series "RB" Crucible Type Melting Furnaces for aluminum and brass melting. Sizes from #50 to #400 crucibles.

3 "HT" Muffle Type Hand-Tilt Furnace for melting Aluminum and Brass. Supplied also in Semi-muffler and Open type.

4 Magnesium Sulphur Dome Melting Furnaces with protective atmosphere over bath area.

5 Aluminum Melting Furnace especially designed for aluminum die casting work. Furnished in 150 to 675 lb. crucible sizes.

Write for descriptive bulletins on models in which you are interested.
Eclipse Fuel Engineering Co., 725 So. Main, Rockford, Ill.
Representatives in all principal cities.

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Gas Combustion Equipment, Industrial Gas Furnaces, Steam Boilers and Dowtherm Generators.

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HARD SETTING

A metallic cement that expands as it dries making a permanent surface patch on iron and steel castings. Proved best in 25 years of foundry service. Dark and light shades in one to 100 lb. containers. Free sample on request. *Manufactured by*

AMERICAN CRUCIBLE COMPANY
SHELTON, CONN.

(*Concluded from page 244*)

conveyor system of this type must be designed to fit the castings to be made. One person operates the complete sand conditioning system, which is capable of producing an average of 4 tons of sand per hour.

Overall cost of this system, which serves eight molders, was $25,000. Management states that the cost of their products have been reduced tremendously.

(*To be concluded next issue*)

Z-Metals Research Institute Formed

Formation of the Z-Metals Research Institute Inc., an organization whose purpose is to sponsor research and development of the pearlitic malleable iron commercially known as Z-Metal, recently was announced. Headquarters of the institute are at 1060 Broad St., Newark, N. J. Members of the institute include Z-Metal Inc., owner of patents on Z-Metals, and several of its licensees.

Directors of the organization are: Duncan P. Forbes, president, Gunite Foundries Corp., Rockford, Ill.; P. E. Landolt, president, Z-Metals Inc., New York; Brinton Welser, vice president, Chain Belt Co., Milwaukee; A. F. Crone, vice president, Acme Steel & Malleable Iron Works, Buffalo; J. F. Linsley, director of research sales, Eastern Malleable Iron Co., Naugatuck, Conn.; A. C. Moore, president, Chicago Railway Equipment Co., Chicago; P. H. Vincent, general manager, Erie Malleable Iron Co., Erie, Pa.

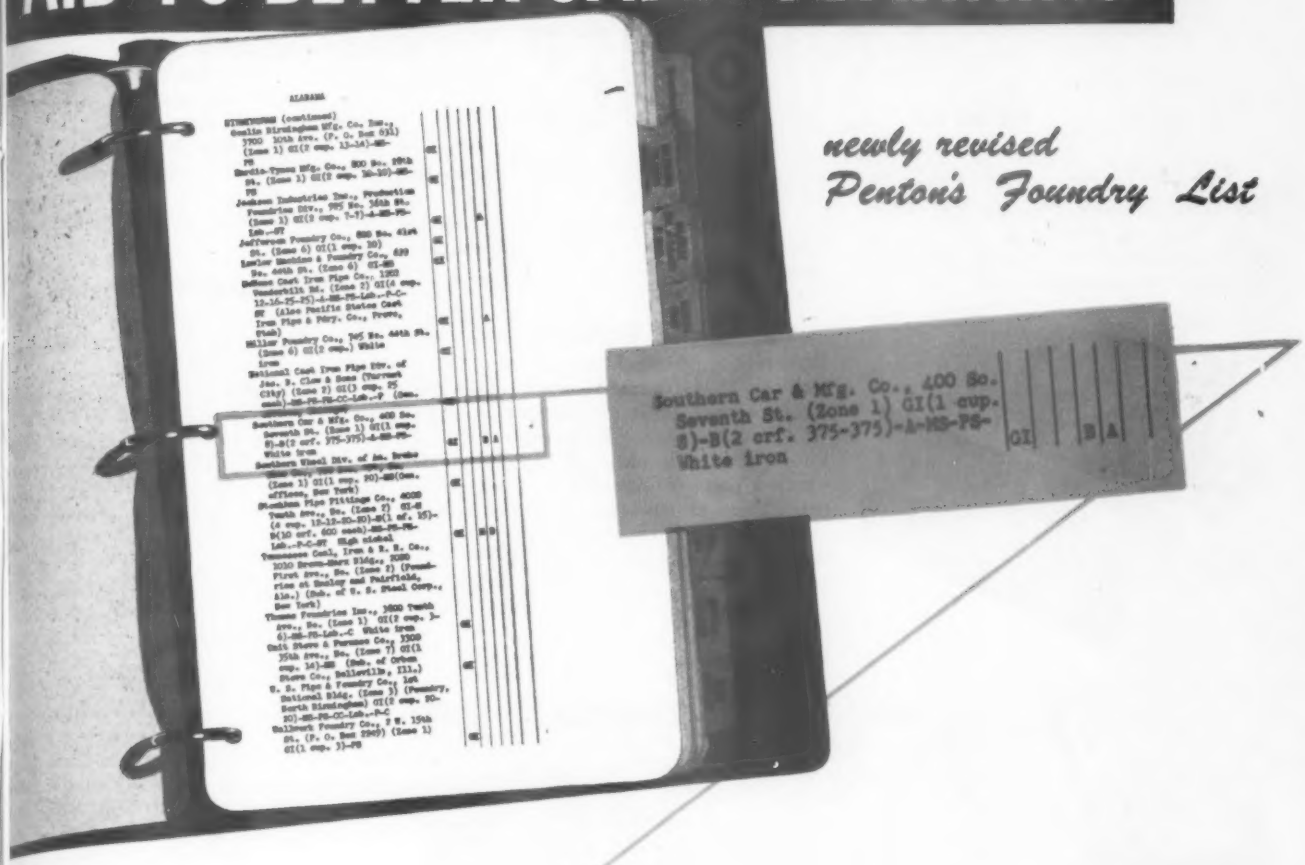
Officers are: President, Duncan P. Forbes; vice president, secretary and general manager, Glynne Morris, formerly secretary and treasurer of the Alloy Casting Research Institute; treasurer, Lester A. Crone, Acme Steel & Malleable Iron Works. C. R. Wiggins, formerly of Republic Steel Corp., is staff metallurgist.

A contract has been entered into with Battelle Memorial Institute, Columbus, O., whereby Battelle will continue on an enlarged scale the research work it has been conducting for the past few years under the sponsorship of the licensor.

New Sales Office Is Opened

Robins Conveyors Inc., Passaic, N. J., and its affiliate, Hewitt Rubber Corp., Buffalo, have opened a new office in the United Carbon building, Charleston, W. Va. R. U. Jackson, representative of Robins Conveyors in that vicinity for the last 15 years, will be in charge of the new office, assisted by H. N. Kepler, sales engineer, who was formerly in the Washington office. Nelson J. Reinhold, until recently associated with Cincinnati Rubber Co., has joined Hewitt Corp. as a salesman.

AID TO BETTER SALES PLANNING



newly revised
Penton's Foundry List

WHAT IT IS

PFL is a biennial census of the foundry industry compiled by the Penton Publishing Company. The newly revised edition is just off the press and provides you with up-to-date market information at less than 1c a name. Nowhere else is so much foundry information available for so little.

WHAT IT DOES

PFL gives you accurate market information on

—The names and addresses of all foundries.
—Type and number of melting units.
—Capacity of melting units.
—Type of metal melted.
—Departmental operations. (Pattern shops, machine shop, laboratories)

HOW IT HELPS YOU

PFL aids your sales manager in

—finding and evaluating new prospects
—scheduling service and engineering calls
—analyzing sales territories
—determining market size and scope

Valuable to your advertising department in revising and correcting your mailing lists.

Compiled and Published by

THE PENTON PUBLISHING COMPANY

Book Department

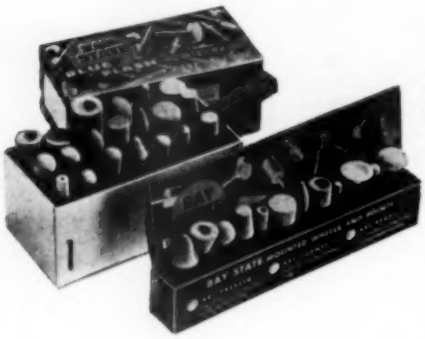
1213 WEST THIRD STREET — CLEVELAND 13, OHIO

Publishers of

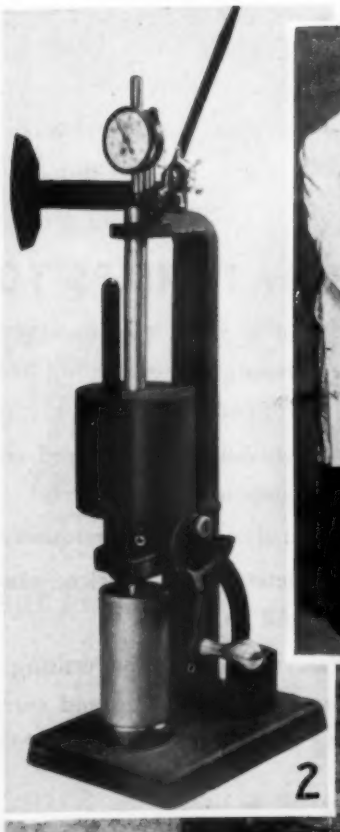
THE FOUNDRY

NEW EQUIPMENT and SUPPLIES

(1)—Wheels and Points: Bay State Abrasive Products Co., Westboro, Mass., is offering a new compact package of 12 mounted wheels and points in sizes most commonly used, as a supplement to its other set of 20 pieces. They are packaged for easy identification on stock shelves, and to minimize fumbling and delay in their selection by operators.


1

(2)—Sand Rammer: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4, Mich., announces an improved sand rammer built in accordance with AFA specifications. It incorporates features intended to aid sand technicians to obtain a precisely rammed 2 x 2-in. specimen. These improvements include: Longer weight raising cam bearing; take-up on weight raising cam bearing; lever cam for conveniently raising rammer-plunger-weight assembly during loading and unloading; greater strength in rammer support frame; greater weight in base; flowability indicator mounted on top to improve visibility of dial, cleanliness and life of indicator; flowability indicator automatically moves to inoperative position on raising plunger assembly; moisture and flowability indicators are actuated by contact with flat end of plunger rod. The rammer illustrated is equipped to determine moisture and flowability, while the rammed specimen is used to test permeability, green and dry compression strength, green and dry shear strength and the sintering test of molding sand.


2

3

(3)—Hardness Tester: Clark Instrument Inc., 10200 Ford Rd., Dearborn, Mich., has designed a new Rockwell hardness tester for handling large or cumbersome parts. It can handle parts ranging from ½ to 26 in. The table is raised and lowered by a hand crank, while position of the capstan may be correspondingly adjusted in relation to table height. A roller bearing carriage facilitates positioning heavy parts on the table. Readings are taken exactly as with the ordinary Rockwell tester, using either a diamond or steel ball penetrator.

(4)—Trough Conveyor: Link-Belt Co., 307 North Michigan Ave., Chicago 9, Ill., announces a new oscillating-trough conveyor for handling sharp, jagged, abrasive, wet, oily or hot material. Although installations have been made in foundries, steel mills and machine shops engaged in war work, this is the company's first official announcement of the conveyor's development. It consists of a flexibly-supported plate steel trough of rectangular cross section which is oscillated back and forth by an eccentric drive at a speed resulting in a forward travel movement of 20 to 50 fpm for most materials, depending on flowability of the material and type of unit. The conveyor can be built to handle a wide range of capacities. In foundry service it has been used to handle both the hot shakeout sand and hot castings, with little wear on the trough.

(*Continued on page 250*)

4

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See that trademark? It appears on every WEMCO ingot, signifying the pride we feel in our product. To you it signifies dependable metal, uniformly the highest quality, the kind of metal you will take pride in using in products bearing your name. For Brass, Bronze and Aluminum of uniformly highest quality, specify WEMCO Ingots.
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- Scientific Foundry Management
- Manufacture of Centrifugal Castings

High Alloy Steel Centrifugal Casting showing cross sections formerly made from a series of forgings. Thin section 1/16-inch—100 per cent X-Ray Inspection.

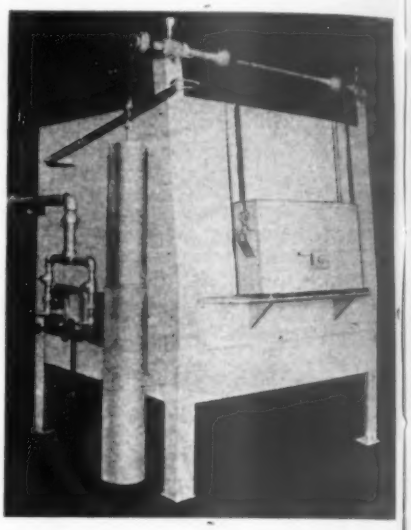
W. G. REICHERT ENGINEERING CO.

1060 Broad Street —*Foundry Specialists*— **Newark 2, N. J.**

(*Continued from page* 248)

reported after 16-months' service. It is designed in two types—a long-hanger construction, recommended where trough tunnels below conveyor are permissible or where it is possible to floor-mount the conveyor; and a short-hanger construction which permits installation in a shallow trench along the floor.

Batch Furnaces: W. S. Rockwell Co., 50 Church St., New York 7, N. Y., is offering a complete line of standard oven or hearth type batch furnaces for normalizing, drawing, stress relieving and other heat treating operations. Range of heating for gas or electric types is 600 to 1800 F and for the oil-burning type (shown here) 1200 to 1800 F. The furnaces are available in 18 hearth sizes from 12 x 18 in. to 48 x 96 in., broad enough for load (steel) ca-



pacity of 50 to 1070 lb. They are made with reinforced steel shells, lined with refractory and insulation to meet the most severe heating conditions with minimum heat absorption and heat losses. A cast iron, insulating-refractory lined inclined door makes a tight heat and atmosphere seal and is easily operated by a hand lever.

Wetner: General Electric X-Ray Corp., 175 Jackson Blvd., Chicago 4, Ill., has added a double-purpose wetner to its line of x-ray film developing materials. One purpose of the solution is to act as a wetting agent for x-ray developer and refresher, the other as an anti-spotting, quick-drying rinse. For the former purpose only 2 cc is added to each gallon of developer and refresher, while 4 cc is used with each gallon of tap water as a final rinse.

Paging System: Talk-A-Phone Mfg. Co., 1512 South Pulaski road, Chicago 23, has developed a power unit whereby an inter-communication system also becomes a paging system. The new power unit is capable of delivering a

(*Continued on page* 252)

FANNER CHAPLETS

Whatever your CHAPLET requirements may be, there is a FANNER CHAPLET to fit the job.

THE FANNER MANUFACTURING COMPANY, CLEVELAND 1, O.

THE CANADIAN FANNER LTD., HAMILTON, ONTARIO, CANADA

NEW "MASTER" *Challenges them all!*

For heavier off-balance loads . . . for continuous high-production . . . for free-spinning power . . . for massive construction!

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CENTRIFUGAL MACHINE & ENGINEERING CO. — 633 Jackson Court — KALAMAZOO 7, MICH.

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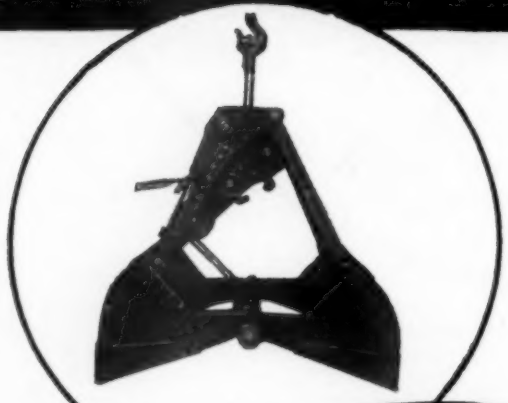
ERIE BUCKETS



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Aggre Meters • Buckets • Concrete Plants • Traveling Cranes

(*Continued from page 250*)

minimum of 15 watts "voice range" power, more than sufficient to cover the average paging system requirements. By the use of more than one unit greater power levels are available. The unit is so designed that when an answer is received from the outlying station, the voice comes through at regular reduced office volume. Calls from the master station are amplified to penetrate high noise levels in the factory.

Laboratory Furnace: K. H. Huppert Co., 6830 Cottage Grove Ave., Chicago 37, Ill., has developed a small electric furnace equipped with built-in control for maintaining any desired tem-

perature between 200 and 1750 F. It measures 3 x 3 x 3 in. ID and 8½ x 10½ x 8½ OD. Operating on 110 volts ac, its current consumption is 500 w. The unit's precision control is said to result in extremely low operating costs.

Sand Binder: A new organic binder has been developed by Delta Oil Products Co., Milwaukee 7, for use in skin-dried, dry-sand and green-sand molds and cores. Composed of a pure hydrocarbon and organic vegetable binders the material is said to require only the removal of water to develop maximum tensile strength and surface hardness of the sand. Bonding properties are claimed to be only slightly affected by addition of bentonite, fireclay or silica flour in the sand mixture, and are as efficient in old sand as in new sand. Material becomes waterproof after drying, withstands high torch heat without crumbling of sand edges, reduces cleaning costs and improves casting surface.

Ferromanganese: Electro Metallurgical Sales Corp., unit of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17, announces a new special low carbon ferromanganese. It is produced in the maximum 0.10 per cent carbon grade. Following is a typical analysis: Mn 90 per cent min.; P 0.06 per

(*Continued on page 254*)

THIS chunk actually contains only 2% LITHIUM — approximately ½ ounce. The other 98% consists of Cu, Zn, or bronze proportioned to match your melt. Yet this small quantity of metallic LITHIUM is sufficient to remove hydrogen and other gases, oxides, sulphides and other non-metallic impurities from a 200 pound melt of copper or bronze.*

LITHIUM metal works because it combines with these impurities forming non-metallic compounds of low specific gravity, insoluble in the melt and having a melting point below the casting temperature of the metal. These compounds volatilize, or flux out quickly, thus increasing the fluidity which often permits lowering pouring temperature. As a result, your castings are clean and sound, possessing optimum physical characteristics.

LITHIUM treatment requires no new technique, no new equipment, no special training for your crew. Our technical staff and our own casting facilities can be placed at your disposal.

*Tin bronze or silicon bronze.

10-LC-3

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Don't Close Windows!

Use Windows for Exhausting Stale Air

Why let winter's stale air stifle production when efficient Propellair exhaust fans can keep atmosphere fresh and *invigorating?* Clean, healthful air *boosts* output and morale; keeps workers happy, *on the job.*

Windows are ready-made openings for the *quick and low-cost* installation of modern Propellair direct-connected fans. Each is a self-contained unit, readily mounted on plywood or a sheet metal panel. Outside louvers can be supplied which close automatically when fan is inoperative.

Really Move Air

Propellair scientific blade design employs variations of pitch, curvature, and *thickness* to compensate for the different lineal speeds of points at various radii. Result: *Uniform* air flow over whole fan area. The *whole* blade works, not just the *tip,* for high-volume, high-velocity discharge.

Direct-Connected Type CD Fan

Propellair fans don't *"fan the air"*—they *move* it, and with minimum h. p. for maximum c.f.m. They are simple, compact, easy to install; cut maintenance to routine servicing. Ask us for free 72-page Book No. 10-F.

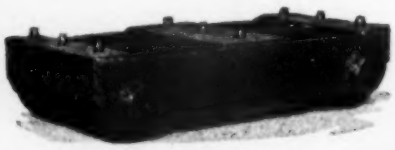
"MOVING AIR IS OUR BUSINESS"

PROPELLAIR INC
SPRINGFIELD · OHIO

(*Continued from page* 252)

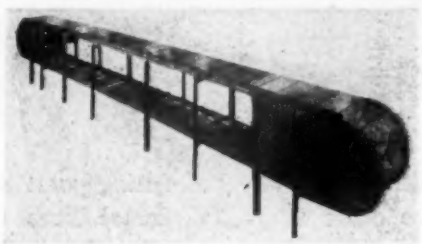
cent; C 0.06 per cent. The high ratio of manganese to undesirable elements makes it particularly useful for adding manganese to stainless steel and other quality steels where high purity is essential.

Roll Dollies: Techtmann Industries Inc., 828 North Broadway, Milwaukee 2, Wis., is offering a simple type of dolly for shifting machines and other heavy objects weighing up to 10 or 12



tons. Used in pairs, each unit is 18½ x 10½ x 4 in. high and equipped with four steel rollers 3¾ in. in diameter. To use the dollies the machine or load to be moved is jacked about 6 in. from the floor, and two dollies are positioned parallel with each other beneath the load's center of gravity. Jacks are removed and the load will be properly balanced. Cleats of the dollies imbed into wood or timber, providing rigidity.

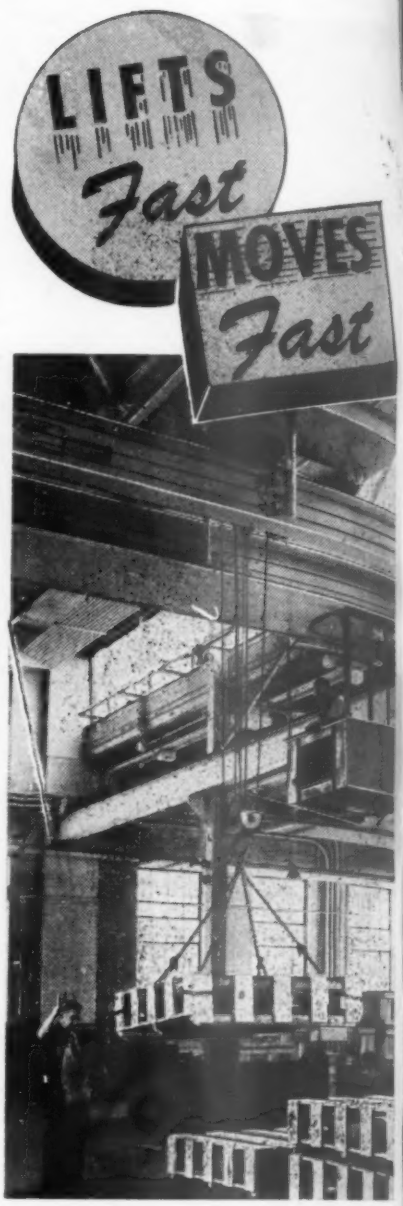
Steel Conveyor: Steel Parts Mfg. Corp., division of Blackstone Mfg. Co., Morgan and Quincy Sts., Chicago, Ill., announces a new all-steel conveyor belt made up of a series of steel plates linked together at the ends and driven by an enclosed sprocket that meshes with



hinges of the belt. It has no sag at any point and no open spaces between links. Belt edges are provided with a guard rail. The belt is suitable for conveying extremely heavy loads as well as light products. Actual load capacity cannot be stated, as each conveyor is engineered specifically for the load it is to carry. Should a belt plate become damaged, it can be removed quickly and a new plate inserted.

Electromagnet: Dings Magnetic Separator Co., Milwaukee 7, Wis., announces a new self-cleaning, rectangular, electromagnet for use where a large amount of miscellaneous iron is to be separated. The unit is automatic in operation, with a cross belt that conveys tramp iron to a discard pile, instead of letting it stick to the magnet face to be dropped back later on the main belt in case of power interruption. The self-cleaning

(*Concluded on page* 256)



Here is a Reading Crane that solved a warehouse problem in the rapid handling of materials awaiting shipment.

The crane was engineered to the needs of the job—span, lift, crane drive, trolley drive, hoisting speed—from standard Reading Crane units at no extra cost. The Reading Crane unit design can save money for you in your materials handling problems. You get an engineered solution to your electric crane problem at no extra cost.

For full information, write for the Reading Crane Catalog.

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OVERHEAD TRAVELING CRANES

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● They stay flat because LIGNOLITE has high transverse strength and resistance to deflection. It is impervious to moisture and does not warp from contact with wet sand or high humidity. LIGNOLITE is half the weight of aluminum, is abrasion proof, of uniform caliper, and may be easily machined, sawed, drilled, tapped. Available in all flask sizes 7/16" to 2" thick or in sheets for own cutting. Write for sample and complete information.

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AGILE
BRONZE
ELECTRODES
for the
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Agile Bronze electrodes possess a copper-tin-phosphor alloy core wire and are recommended for the welding of steel and cast-iron to bronze.

Preheating is not necessary in the welding of bronze castings up to 1/8" thick. These electrodes give the best results when handled in the horizontal or flat positions. Full information will be furnished on request.

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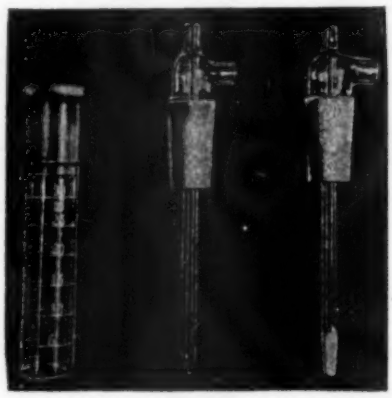
(*Concluded from page* 254)

magnet does away with the down time formerly necessary for discharging iron and scraping the belt. Nonmagnetic angles riveted to the cross belt, plus a fast belt speed, assure quick removal of tramp iron from the magnet face. Oncoming iron cannot pile up and clog this area. Another special feature prevents iron from forming over the magnet in a layer that might drag material passing on to the long conveyor belt. The magnet in standard and heavy duty intensities is available in widths comparable to that of the conveyor belt. The new type separator is particularly applicable where head pulleys cannot be installed, or where excessive main belt speeds are present.

Dust Sampling: Mine Safety Appliances Co., Braddock, Thomas and Meade Streets, Pittsburgh 8, announces new all-glass sampling units for use with



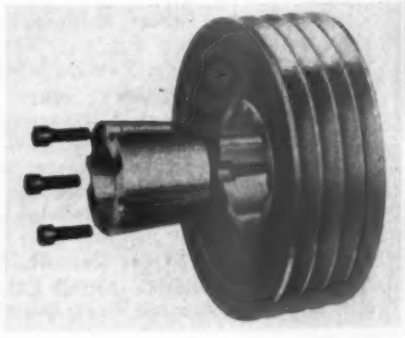
the company's midget impinger widely used in dust sampling. The new glass units include a flask and nozzle with ground glass stopper. A fritted glass bubbler also is available. The device permits easy and thorough cleaning and prevents contamination or discoloration of the sample. The air outlet is placed at maximum height. Possibility of drawing over any of the collecting fluids practically is eliminated. Each nozzle insures a flow of within 4 per cent of one-tenth cfm at 12 in., water vacuum. Units are supplied in sturdy leatheret cases holding nine flasks and nozzles.

Hydraulic Trucks: Lyon-Raymond Corp., 2389 Madison St., Greene, N. Y., is offering a 2000-lb. capacity hydraulic high lift truck in addition to the former light weight unit of 1000-lb. capacity. It is claimed that the light weight, about one-third less than conventionally designed portable elevators, makes the truck suitable for transferring, tiering and stacking materials. The standard stock model has a platform 30 in., wide, 36 in. long and an elevating range from 6 to 60 in., above the floor. Ease of movement is provided by roller bearing equipped 10 in., diameter front and 5 in., diameter rear wheels. A foot operated floorlock making two-point contact with the floor holds the truck firmly in position. A two-speed hydraulic hand pump is standard equipment. A motor driven hydraulic pump may be supplied.

Metalsorter: Farmers Engineering & Mfg. Co., 549 Brushton Ave., Pittsburgh 21, announces a new device, known as the metalsorter, which it is claimed identifies and sorts pure metals, steels and nonferrous alloys. The instrument is portable, simple to operate, requires no special electrical power and makes nondestructive tests through a tribo-electric effect. A metallic specimen of standard, known or acceptable character is rubbed against the surface of an unknown or doubtful piece. If a chemical or metallurgical dissimilarity exists, a minute electrical current is generated and is registered by an indicator on a calibrated scale. Control unit contains a thyratron-operated timing circuit, an electronic bias supply and a measuring circuit.

Preheater: Rempe Co., 342 North Sacramento Blvd., Chicago 12, Ill., has developed a new unit for preheating heavy liquids in bulk storage. It can be made to fit any size tank having a manhole 16½ in. or larger, and is installed by cutting or drilling holes for pipes in manhole of the tank. The heating unit consists of a coil of 1½ in. steel pipe providing 38 sq ft of direct radiation surface, and employs steam or hot water. To assure preheating it is provided with a flow accumulator which makes it necessary for liquids to flow over the coils before entering the suction line.

V-Belt Sheaves: Dodge Mfg. Corp., Mishawaka, Ind., announces a new and effective means of quickly mounting and demounting V-belt sheaves. With the new sheave and bushing on the shaft it is only necessary to tighten two or three locking screws. The screws are in threaded engagement with the sheave hub and free



in the bushing groove. As the screws are tightened, they push against the tapered bushing and force it into the tapered bored hub. Process is reversed to remove the sheave. This permits the use of flangeless bushings and eliminates extension of either hub or bushing, or the need for collars. Construction also makes possible the provision of a wider range of bores and permits application to all stock sheaves.

It's Modern...

VIBRATING IN ALL DIRECTIONS!

SETS NEW STANDARDS—By duplicating the technique used by the skilled molder in rapping a pattern in all directions to free it from the sand, the VIBROLATOR makes possible easier, cleaner, quicker draws—consistently!

The VIBROLATOR sets new standards of performance—at the same time eliminating distorted and egg-shaped castings. It will boost production, greatly reduce scrap, and, because of its simple and scientific design, will give years of trouble-free performance!

WHY THE VIBROLATOR IS BETTER

- ★ Will Not Jam
- ★ All-Directional Vibration
- ★ Adjustable Speed and Power
- ★ Operates on Wide Range of Air Pressure
- ★ Quiet Operation
- ★ Self-Starting—Springless.
- ★ Self-lubricating
- ★ No Wearing Parts

THE **PETERSON** VIBROLATOR OBSOLETES ANY OTHER METHOD NOW IN USE!

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SIZES FOR ALL REQUIREMENTS

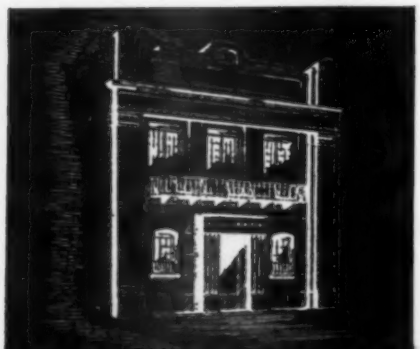
Size	Weight	Price
3/8"	5 oz.	$ 9.50
1/2"	9 oz.	11.75
5/8"	12 oz.	13.50
3/4"	17 oz.	15.00
7/8"	22 oz.	16.50
1"	25 oz.	18.00

Complete Facts and Immediate Delivery

It will pay you to get complete facts on the VIBROLATOR. Better still, write your order now for prompt shipment!

Martin Specification Sheet Will Be Sent Upon Request

ENGINEERING COMPANY **Kewanee, Ill.**



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- Plant Layout
- Production Flow
- Work Standards and Costs
- Job Evaluation
- Wage Incentives
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ASSOCIATED ENGINEERS, INC.

Joseph C. Lewis, President

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AEI

NEW TRADE PUBLICATIONS...

WASHROOM INSTALLATIONS: Bradley Washfountain Co., Milwaukee, offers a helpful, informative booklet which contains numerous blueprint layout reproductions in which washfountains and multi-stall showers manufactured by the company, have been installed. Included in the booklet are scale model cutouts for planning and determining desired washroom layouts.

MAGNESIUM CASTINGS: Superior Bearing Bronze Co. Inc., 140 Banker St., Brooklyn 22, N. Y., offers an 8-page brochure which describes the machining and finishing of magnesium castings. Tables indicating relative weights of metals, recommended speeds, feeds and depths of cut for turning, boring and milling magnesium, methods of corrosion prevention, cleaning methods, chemical treatments and polishing magnesium and magnesium alloys are included.

METAL-CUTTING TOOLS: A new catalog, "Haynes Stellite Metal-Cutting Tools," which describes the high production metal-cutting tools made from metal alloys, has just been published by Haynes Stellite Co., Kokomo, Ind. The catalog includes descriptions, illustrations, engineering drawings specifications, and prices for standard tools manufactured by the company.

DIE CASTING MACHINES—An 8-page booklet recently issued by Lester-Phoenix Inc. features heavy beam-type frame, single die adjustment with central support, hydraulically actuated double toggle links with cam and wedge block support, electric time clock cycle control, central automatic hydraulic ejector, locking and control mechanism, cold chamber injection at slow speed, pre-fill injection system for cold chamber, and automatic hydraulic time control high pressure die casting machines with specifications and die dimensions.

TORCHES AND TIPS: Victor Equipment Co., 844 Folsom St., San Francisco 7, is offering Form 52-10M-6-45, which is devoted entirely to hand and machine cutting torches and tips. This colorful 36-page catalog also illustrates cutting torches and tips for fuel gas and every type of cutting operation encountered in industry.

GRAB BUCKETS: Bulletin No. 675, recently issued by the Hayward Co., 50 Church St., New York 7, gives full details of a grab bucket of an improved design that enables it to dig or rehandle one pound of coal or coke for each pound of bucket weight. The bulletin is useful to operators of bridge towers, cableways, cranes and other handling rigs. It contains illustrations showing modern methods of handling coal, and a chart of bucket load capacities, weights and dimensions.

MAINTENANCE MATERIALS: Materials for resurfacing, patching and waterproofing floors, walls, roofs, etc., are suggested in a colorful pamphlet published by Stonhard Co., 401 North Broad St., Philadelphia 8, Pa. A maintenance inspection service covering such problems as rutted and worn floors, driveways, trucking aisles and ramps, leaky outside walls, elevator pits, subbasements, roof surfaces, flashings and gutters, also is described.

GRINDING WHEELS: Precision Diamond Tool Co., 30 West Washington St., Chicago 2, Ill., offers Catalog 44, a 20-page illustrated folder describing the latest development in diamond wheels for external and internal grinding. Illustrations and specifications of mounted cones, wheels for combination face and straight grinding, hand hones, wheel dressers as well as style numbers and prices are included.

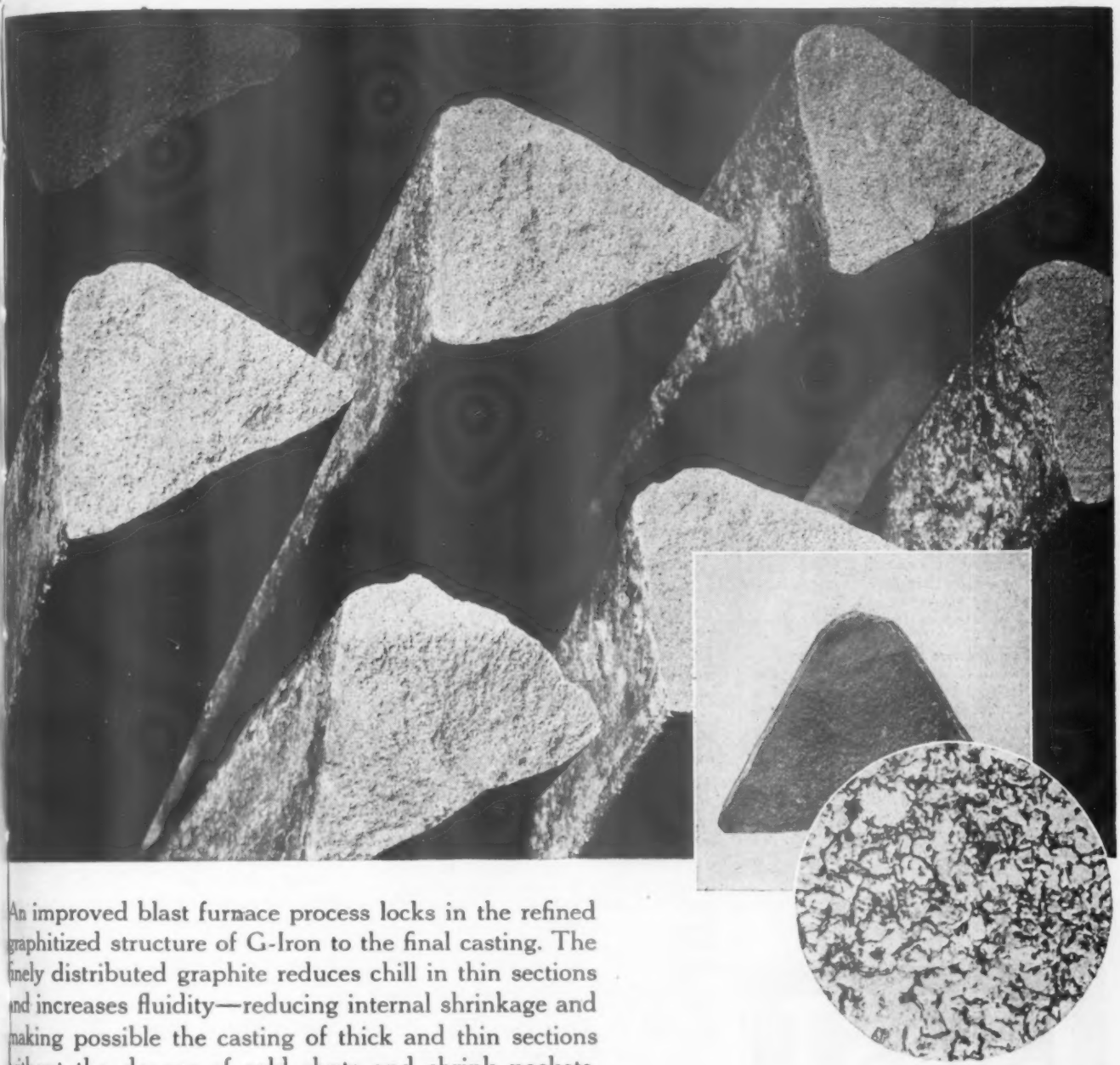
CONVEYORS: Bulletin No. 66, a 12-page colorful folder offered by Standard Conveyor Co., North St. Paul 9, Minn., contains 41 illustrations of standard conveyor installations in steel mills, foundries, machine shops, airplane and electrical appliance manufacturing plants. Descriptions of escalators, rollers, pneumatic tubes and spiral chutes for handling flat sheet aluminum and steel, coil steel, brass coils, cartons, machine and bulkhead parts, drag conveyor moving and foundry flasks, crankshaft counterweight parts, blueprints, production orders and small parts are contained in the booklet, sent free on request.

LEATHER BELTING: Catalog No. 45, offered by Page Belting Co., Concord, N. H., is a complete loose-leaf 48-page brochure containing descriptive information covering flat, link, lace and V belting, belt cement, dressing and tools, cup and valve leathers, hydraulic and pneumatic packings, leather fillet, mill, loom and hardware straps, curried leather and leather mats. Belt engineering service in mechanical power transmission, price lists and data sheets are included.

FILTERSCREEN: Briggs Clarifier Co., Ceramics Division, 1339 Wisconsin Ave., Washington 7, has published an 8-page illustrated booklet containing diagrams and photographs which describe a ceramic filterscreen, useful in pouring all types of nonferrous metals and their alloys to produce denser, stronger and defect-free castings. Filterscreen may be used to eliminate special gates and also acts as a separator or parting agent between riser or gate and casting, allowing riser gate to be knocked off with hammer blow when metal has cooled.

BLAST FURNACE EQUIPMENT: Edgar E. Brosius Co., Sharpsburg, Pittsburgh 15, Pa., has published a colorful 20-page catalog, illustrating and describing a complete line of auto floor charging machines, manipulators, overhead chargers, goggle valves, electric mechanical and electro hydraulic clay guns, grab buckets, dry slag granulating mills adaptable for use in blast furnaces and steel mills.

G-IRON'S* uniform grain refinement is locked into every pig



An improved blast furnace process locks in the refined graphitized structure of G-Iron to the final casting. The finely distributed graphite reduces chill in thin sections and increases fluidity—reducing internal shrinkage and making possible the casting of thick and thin sections without the danger of cold shuts and shrink pockets.

*G-Iron is graphitized pig iron. The photographs show its grain structure. The Photomicrograph (circle, etched, 500 diam.) shows the random graphite evenly distributed. Manufactured under U. S. and Canadian patents.

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Division of AMERICAN RADIATOR & Standard Sanitary CORPORATION

SHOT BLAST quickly wears out the ordinary protective cover liners of sand blast machines. In one Michigan foundry, for example, liner life was only 95 hours. Then Coast Metals Hard-Facing was applied, and now liners average 760 hours! Another foundry that faces liner plates with Coast Metals saves $15.25 every 33 days, and eliminates 10 replacements a month.

No wonder more and more plants are relying on Coast Metals Hard Facing! Because of its resistance to wear, abrasion, shock and heat, it stretches the life of new or worn parts several times. Application is simple—by arc or acetylene welding. Use it on surfaces, edges, points to keep equipment on the job and save shut-downs.

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COAST
METALS
hard-facing weld rods
MAKE YOUR
EQUIPMENT
LAST LONGER

INSULATING PADS AND RISER SLEEVES

(*Continued from page* 111)

b. Possibility of Sand Contamination.
   1. This can be prevented to a large extent by removing the powder and sleeves prior to the "shake-out", or by making the prefabricated pieces strong enough to resist breaking up during the "shake-out", so they may be removed later.
   2. Use of a new sand facing would eliminate the problem.
   3. It is not expected that this would prove serious, but it is a problem which would have to be solved by each individual shop.

Acknowledgements—The authors wish to express appreciation to the various members of the Foundry and Research Staff for their interest and assistance, and in particular to George Schmidt for his sketches which serve to clarify certain of the illustrations.

Appendix—The material used in making the insulating pads and riser sleeves discussed in this report was gypsum. A great variety of other materials are suitable and several were tried, but none was superior to gypsum in insulating quality, general ease of fabrication, and cost. Since our interest is mainly in developing the theory and practical technology of a given foundry process or procedure no attempt was made to test all possible materials or to develop new materials, particularly when gypsum proved so satisfactory.

Several different grades of gypsum are available for special purposes; the type marketed as "Metal Casting Plaster" was used for the work described in this report. This particular grade has been developed specifically for use as molding material in making nonferrous castings of superior surface appearance and to close tolerances. It is essentially plaster of paris (calcined gypsum) to which have been added about 20 per cent of fibrous materials such as "moldene" or its equivalent.

The procedure for making riser sleeves and insulating pads with gypsum products will be found illustrated in Figs. 54 to 65 inclusive. Here are described various steps in the order of their occurrence, although variations may be necessary or beneficial to the practice of individual shops. Fig. 54 shows a number of wood plugs and a wood mold in which any one of the plugs may be placed to make either blind or open risers. The plugs on the left are used to form blind risers and those shown on the right make open risers, some of which are used as "necked-down" riser sleeves. Assembled mold forms are shown in Fig. 55. The mold forms must be coated with a separating agent before the plaster slurry is poured into them, and this is illustrated in Fig. 56. The separating agent is a water repellant coating and is usually brushed on the mold but may in some cases be sprayed.

Figs. 57 and 58 show water and gypsum being weighed to the proper proportions to give what is termed a 160 consistency. It will be found after very little experience that the best and most practical way to mix the slurry is to sprinkle the gypsum on top of the water, as seen in Fig. 59, and to allow it to settle or soak for approximately two minutes before hand mixing. Fig. 60 shows a batch of slurry being hand mixed until it is a lump free creamy consistency. After the slurry starts to cream or thicken it is poured into the riser sleeve form, or block form, for use as insulating pads. See Fig. 61.

The plaster slurry becomes a solid mass approximately 15 minutes after it is mixed, and any excess, as shown in Fig. 62, can be struck off even with the top of the form with any piece of flat metal or wood. If the mold is properly coated with a separating agent the "set" plaster sleeve will be easily removed from the form by a few gentle raps to break a vacuum which tends to form between plaster and mold surfaces. This is shown in Fig. 63. Various sizes and shapes of open riser sleeves are shown in Fig. 64, and Fig. 65 shows a number of green slabs of plaster, as well as several riser sleeves, in an oven ready to be dried before being used in the production of castings.

Add Portland Cement

Some explanation at this point may be in order to clarify the meaning of the term "consistency." The word as used in this report means the plaster to water ratio used in making insulating sleeves and pads. A 160 consistency, which is used in all the sleeves and pads of this report, means 160 lb of water to 100 lb of metal casting plaster. When the plaster to water ratio is maintained at or close to the 160 consistency very little if any cracking of the sleeves will occur during the drying operation. If the dried sleeves are too soft and fragile for practical use it may be desirable to make an addition of portland cement to the dry gypsum before it is added to the water. It has been found that 20 per cent of portland cement by weight added to the dry gypsum will substantially increase the mechanical strength of the dried sleeve, with little or no effect on its insulating quality.

Sleeves and insulating pads made of gypsum products must be dried before they are used in molding operations. The temperature that has been found to be satisfactory is from 400 to 1200 F and the time necessary to dry a given sleeve or pad will depend upon the drying temperature. If the higher temperature range is utilized for faster drying a certain degree of cracking can be expected if the sleeves are removed from the furnace and air cooled to room temperature; however, slight cracks have no noticeable effect on the insulating qualities but do

(*Concluded on page* 262)

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One of a series of messages prepared by the Business and Industry Department of St. Joseph's of Indiana, college for men, at Collegeville, Indiana.

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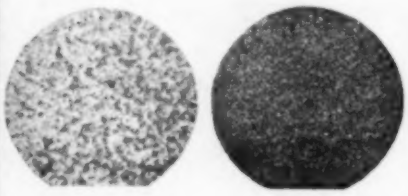

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Write for samples, make your own test.

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(*Concluded from page 260*)

weaken them somewhat mechanically.

Several satisfactory parting or separating agents have been successfully used, such as stearic acid, petroleum jelly, light lubricating oil, lard oil, etc. An emulsion of granulated soap, water, and light lubricating oil, 40, 30, and 30 per cent, respectively, by volume also works well as a mold form coating.

Several variations of plaster of paris have been tested and found to work very well as insulating materials for riser sleeves and pads if a few precautions are observed. In using 100 per cent plaster of paris it is necessary to keep the slurry in suspension until creaming or thickening has started, to prevent a settling action from occurring which will produce a very dense hard structure on the bottom of a riser sleeve and a porous weak structure at the top. An accelerator can be used to speed up the "set" of the plaster thereby decreasing the time of "set." Approximately 1½ per cent of terra alba is a good proportion of accelerator to dry material to use.

Various materials, such as short fibered asbestos, vermiculite (expanded mica), moldene or its equivalent, diatomaceous earth, and other such materials which will absorb water, can be used satisfactorily with plaster of paris to insure uniform texture in the finished sleeves.

"Metal Casting Plaster" can be obtained from the U. S. Gypsum Co., the National Gypsum Co., or any organization selling similar products. The approximate cost of fibered metal casting plaster is about $30 per ton exclusive of freight charges, etc. A molding plaster of paris can, however, be obtained at about half this cost, and any number of materials such as those mentioned can be added to it to produce a workable material.

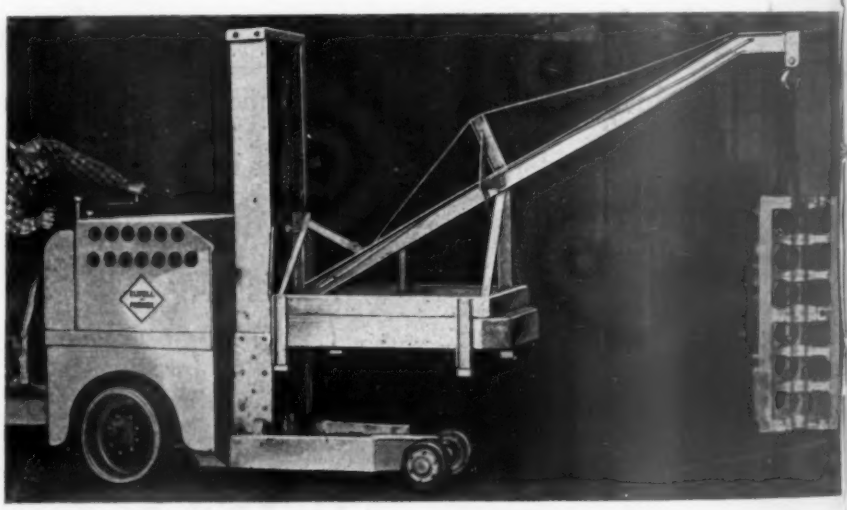
The metal compositions used for the tests illustrated in this report were as follows:

Manganese Bronze	Composition "G" Bronze
58 per cent Cu	88 per cent Cu
38.5 per cent Zn	9 per cent Sn
1.0 per cent Fe	3 per cent Zn
1.0 per cent Al	
0.75 per cent Mn	
0.75 per cent Sn	

Foundry Marks 99th Anniversary

One of the country's oldest foundries, the Logan Foundry & Machine Co., Logan, O., is marking its 99th anniversary this year. The original partners were Raymond Belt, who came from Newark, and Robert Van Atta, of Van Attasburg, O. Owners throughout the years have included: James Henderson, O. C. Pierce, John VanDevort and Scott Braddock. Present owner is Elias Beren, who took over in 1920. Present manager, Louis Lavine, has been in charge since 1928. Jake Herzog, still employed as a molder, has been with the company 51 years. An old canal was the shipping outlet for the firm for many years.

Applies Detachable Boom to Lift Truck



The accompanying illustration shows a simple boom attachment devised by a machine tool builder for handling castings of a size not readily transported in skid boxes or for which delivery is required to spots not reached by an overhead traveling crane. This detachable boom, applied to an Elwell-Parker high-lift platform truck, performs a wide range of such intermediary transportation jobs. It is attached in a few minutes by driving the truck platform underneath; a latch bar on the device then is engaged with a cross member of the truck's elevating mechanism, which holds it firmly while a load is being lifted and transported. Elwell-Parker Electric Co., Cleveland, builds a detachable boom for use with its trucks which has a separate motor for elevating and lowering the load by means of a cable. The lead from this motor can be plugged into the truck's regular battery equipment to obtain electric power.

THIS FOUNDRY SYSTEM HAS BEEN GROWING SINCE 1926

During pouring time, when minutes count, is when Cleveland Tramrail equipment is especially helpful.

The first installation of Cleveland Tramrail at the Pohlman Foundry Co., Buffalo, New York, was purchased in 1926. Every few years since that time their system has been extended. More rail here — another crane there — perhaps a few new chain or electric hoists.

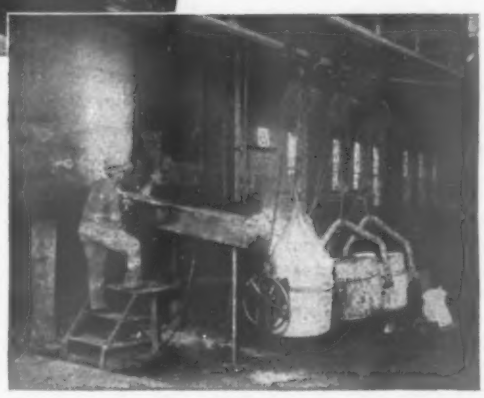
"We here at Pohlman are pretty much sold on Cleveland Tramrail," says the foundry engineer.

Obviously overhead materials handling equipment has proven advantageous to Pohlman. Equally obvious must be the fact that Cleveland Tramrail has been serving this company satisfactorily for 18 years.

Cleveland Tramrail is at work in every department of this important foundry. It is especially advantageous when pouring. By means of the overhead rail system metal is easily conveyed with safety from cupola to the various floor sections and transferred to smaller pouring ladles. The latter are pushed to the molds on individual carriers.

The overhead system not only eases the work and aids safety during pouring, but it is a big factor in improving the efficiency of sand handling, mold making, shakeout, sand blast and other work.

(Above) *Keeping the small pouring ladles full is easy and safe. Scampering long distances with hot metal is eliminated.*



(Right) *Heat loss is kept at a minimum because the metal is taken directly from cupola to pouring floor quickly via the smooth overhead tracks.*

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Handles flasks up to 18 x 30 inches. Comes complete with benches. Portable or Stationary Type.

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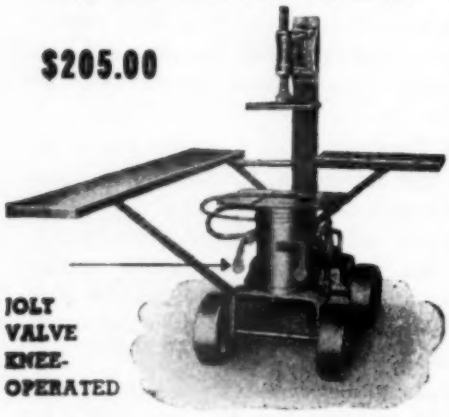

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Molding Machine Manufacturer for Over 20 Years
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RESEARCH IN CHILLED CAR WHEEL INDUSTRY

(*Continued from page* 114)

Tellurium provides a sharp demarcation between chill and gray iron portions, but for various reasons this condition was not desired in the car wheel structure—not to mention possible difficulty in commercial practice to add the small quantity, measured in a few grams per 1000 lb of metal, without running into a deeper chill than desired. Here it might be pointed out that the minimum clear chill required is ⅜-in., and usually is maintained at ½-in. Also, it is desirable that graphite precipitation begin at that point, and the transition from white iron to gray iron take place through a narrow zone. After considerable research and study it was found that by combining the effect of the powerful carbide stabilizer, tellurium, with that of a powerful graphitizer such as carbon or graphite, the transition zone could be controlled or regulated to almost any desired width. Results indicated that the most satisfactory ratio is one part tellurium to 30 graphite by weight, and that is present practice.

Hence, the use of tellurium in chilled car wheel production is to control the width of the transition zone or mottle rather than to produce chill. Also, it produces a fine, dense mottle. In use the graphite addition is made by floating a section of an electric furnace electrode on the ladle of molten metal, or by the addition of loose graphite. Chill test bars are taken from the ladle and, after fracture, indicate to the cupola operator the quantity of tellurium to be added.

Car Wheels Are Annealed

Annealing of wheels to provide the most satisfactory final structure has been practiced since 1848, when Asa Whitney was granted a patent on an annealing pit. However, it was only comparatively recently that this procedure received close attention. In 1936, after about a year's investigation, the insulated annealing pit was developed and adopted by all members of the Association of Manufacturers of Chilled Car Wheels. The pits, 38 in. in diameter inside the pipe guides are lined with 6 in. of light-weight block, and hold from 20 to 24 wheels. Openings are provided along the sides of the pits near the bottom, center and top for the insertion of thermocouples to determine temperatures at those points, although in routine operations it has been found that top temperatures give sufficient information on the annealing cycle.

Since no heat is used other than that contained in the wheels when inserted in the pits, the wheels must be within a definite temperature range when placed in the pits. Investigation in the development of the pits indicated that, with wheel temperatures on a volume basis of 1550 F, within two hours in the sealed pit the temperature equalized at 1420 F and then the temperature decreased uniformly at the rate of 7° per hour. Wheels placed in the pit temperatures much lower than 1500 F dropped through the critical range too rapidly without the desired relief of casting stresses, and formation of the desired metallographic structure. Wheels placed in the pits too hot tend toward greater precipitation of graphite and decrease of hardness in the tread.

Hence, careful attention is given to shakeout time on chilled wheels so that they can be placed in the pits at the right temperature range. Study has revealed that with good melting and pouring temperature control the wheels on shakeout show a hub temperature of 1900 F, a plate or web temperature of 1550 F, and a tread temperature of 1200 F. On a volume basis the average temperature is around 1550 F. The study also indicated that the average temperature loss per minute with the wheel exposed to the atmosphere is from 2.5 to 3°. Consequently, time between shaking out and placing in the pit is held to 2 to 7 minutes. Wheels remain in the pits for three full days, or 72 hr, when they are removed and stacked in an area protected from drafts.

Duplexing Improves Physical Properties

Considerable investigation has been conducted on the application of duplexing to the production of chilled car wheels. In that procedure the iron from the cupola passes through an air furnace before being poured. Time of passage is about one hour, and during that time the carbon content is reduced from about 3.60 per cent to around 3 per cent, and the silicon increases from approximately 0.50 per cent to 0.80 per cent. Physical structure changes include a finer grain and a reduction in dendritic grain size. Improvements in mechanical properties include increases of 33 per cent in tensile strength, 30 per cent in flange strength, 12 to 15 per cent in plate strength, and practically a doubling of rim impact strength.

Long experience of the Association of Manufacturers of Chilled Car Wheels indicated that microexamination of structures of wheel treads gave valuable information, and it conducts regular examinations of each member's product from various parts of the heat each month. The structures indicate the relative treatment the wheels have undergone from the time of pouring until they are removed from the annealing pits. Specimens removed from the treads are about ½-in. square, and from the microexamination the experienced operator can tell something of the structural characteristics set up in the process of solidification and from a relative standpoint can tell something of the casting stresses which may or may not have been relieved by subsequent heat treatment.

In these examinations four classifications have been set up which are based on the spheroidization of pearlite. One

classification is complete spheroidization of pearlite which likely is to be accompanied by more or less secondary spheroidization. A second classification is average, with more or less spheroidization containing no appreciable amount of lamellar pearlite, and showing the cementite of the pearlite in various transition stages between the lamellar and spheroidal states. Third is passable, with more or less lamellar pearlite but where the lamellae have become straightened out and lie in a parallel line instead of distorted or curved as in as-cast structures. Fourth class is the as-cast structure.

Routine tests applied to chilled car wheels include the drop test for strength, determination of clear chill depth and the thermal test. Those are performed on representative wheels selected from each day's heat. Drop test is performed by dropping a 250-lb weight on the hub of the wheel placed flange down. The wheel is supported on the flange by three anvil blocks which are set in or cast integrally with an iron base plate which weighs not less than 1700 lb. The base plate, in turn, is supported on a concrete foundation 2 to 6 ft thick. Height of the drop varies with the weight of the wheel; however, all weights must stand 12 blows without breaking. After passing the drop test the blows are continued until the wheel breaks, and the depth of chill measured on the fractured sections. Thermal test is accomplished by pouring a band or ring of molten metal around the tread and allowing it to remain in contact for a definite period. Present specifications are a band 4½-in. wide weighing approximately 560 lb which remains 20 minutes. At the end of that time the tread and plate must not show any evidence of cracks or other signs of weakness.

Carry on Constant Research

The association and its members constantly are carrying on research to improve their wheels, and in addition to the previously mentioned work are conducting investigations of wear resistance, improvement of rim and flange strength, etc. The association also operates a central calibration station wherein it regularly checks and repairs optical and thermocouple type pyrometers for its members. As a result of that procedure, temperatures obtained in various plants agree closely, and permit accurate comparisons to be made between data secured from them.

As might be expected, the calibration station comprises only part of the equipment of the laboratory of the association. As indicated in some of the accompanying illustrations, the equipment includes impact testing machines, several heat treating furnaces, including one large enough to hold two full-size chilled car wheels, wear testing machines of the Amsler type and of its own design, metallographic microscope and allied equipment, a 100,000-lb tensile and compression testing machine, etc. Since the chilled treads are extremely difficult to section by ordinary machining methods, the laboratory contains a large abrasive wheel, cut-off machine, which permits the operation to be accomplished in a few minutes.

Further research work underway at the present time includes a study of the wheel hub to develop a more nearly perfect thermal balance during cooling and hence, a reduction in shrinkage stresses due to uniformity of section. Study also is being made on the size, shape and conformation of the brackets which support the wheel flange to improve the impact resistance and also to improve the ratio of gray to white iron in the throat of the wheel. Work is also being conducted on wheel rims and flanges to ascertain how they can be improved. All in all, it can be said safely that the chilled car wheel industry not only understands the value of research, but also actively carries it on to better the performance of its product.

Gives Lectures on Refractories

C. E. Bales, vice president, the Ironton Fire Brick Co., Ironton, O., recently gave an illustrated lecture to the Engineers Club, Huntington, W. Va., and to the Ironton Rotary Club on the vital role of refractories in the war effort. On Sept. 10 Mr. Bales discussed "Refractories for the Steel Foundry" before the New Orleans district group of the Steel Founders' Society of America.

International Builds New Plant

International Molding Machine Co. plans to move next May from its present quarters at 2616 West Sixteenth St., Chicago, to a new plant being built in La-Grange Park, Ill. The new structure will be of one-story brick construction and will cost an estimated $150,000 to $175,000.

Appoints Hercules Representative

Russell F. Lincoln & Co., Lakewood, O., has been appointed sales representative in northern Ohio for Hercules Sling Co., Chicago, and Rockford, Ill., to handle automatic equalizing chain slings and other products manufactured by the latter company.

Opens Sales Office

Aluminum Alloys Corp., Detroit, has opened an office in Grand Rapids, Mich., at 200 North Division St., under the supervision of H. Graham Fairchild, sales representative for that territory. The company operates two foundries in Detroit and specializes in the production of heat treated aluminum alloy castings.

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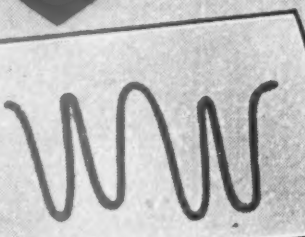

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Foundry Statistics

Malleable Iron Castings

	Production (Tons)			New Net Orders (Tons)		
	1945	1944	1943	1945	1944	1943
Jan.	83,742	75,594	63,572	97,153	93,855	73,524
Feb.	78,385	74,812	66,401	79,913	79,352	87,728
Mar.	86,175	81,480	78,143	98,979	90,038	85,744
Apr.	77,042	69,820	72,559	78,075	88,169	74,241
May	83,013	70,555	69,959	83,421	92,285	77,768
June	71,783	70,993	69,111	35,603	103,692	78,289
July	53,805	61,320	66,011	58,589	106,626	91,653
Aug.	.....	74,297	67,615	....	71,307	08,502
Sept.	.....	74,628	74,874	....	19,501	90,911
Oct.	.....	80,505	74,254	.....	76,536	101,510
Nov.	.....	79,629	72,077	.....	48,149	93,370
Dec.	.....	76,187	75,188	.....	69,972	81,978
Total	.....	889,820	849,764	.....	969,483	1,064,224

Steel Castings

	Shipments (Tons)		Production (Tons)		New Net Orders (Tons)	
	1945	1944	1945	1944	1945	1944
Jan.	201,162	237,570	157,176	159,795	210,182	167,739
Feb.	186,384	211,958	146,165	161,359	214,408	173,592
Mar.	211,890	224,913	166,896	174,626	203,170	162,575
Apr.	190,166	204,279	150,281	155,778	177,707	175,053
May	186,376	210,360	145,092	161,783	89,790	176,993
June	167,140	200,237	125,126	157,444	130,152	181,816
July	133,601	176,735	99,606	131,940	110,681	169,921
Aug.	.....	204,833	.....	154,911	.....	171,309
Sept	...	189,443		144,458		129,847
Oct.	...	197,772		150,716		146,116
Nov		196,475		146,411		130,681
Dec.		90,113		111,121		111,941
Total	.....	2,435,421	.....	1,843,386	.....	1,914,294

Note: Shipments for sale and own use; production and orders for sale only.

Aluminum Casting Shipments

(In millions of pounds)

	Total	Sand	Perm. Mold	Die
1943	459.5	304.2	89.6	65.7
June	36.3	24.1	6.9	5.3
July	37.2	24.7	7.1	5.4
Aug.	38.2	25.4	7.2	5.6
Sept.	40.8	27.2	7.9	5.7
Oct.	42.7	28.5	8.0	6.2
Nov.	43.0	28.5	8.3	6.2
Dec.	41.4	27.3	8.1	6.0
1944	514.5	321.1	106.3	84.2
Jan.	44.1	29.4	8.3	6.4
Feb.	45.9	30.2	8.0	7.5
Mar.	49.5	31.4	9.6	8.1
Apr.	42.9	27.0	8.3	7.3
May	44.7	27.9	8.9	7.5
June	42.4	25.9	8.8	7.4
July	38.7	24.5	7.7	6.2
Aug.	43.2	26.9	9.2	6.9
Sept.	41.5	25.5	8.9	6.9
Oct.	42.1	25.1	9.8	7.0
Nov.	40.5	24.3	9.6	6.4
Dec.	39.0	23.0	9.2	6.6
1945				
Jan.	43.5	25.8	10.6	7.3
Feb.	42.0	24.9	9.7	7.2
Mar.	48.2	27.7	12.2	8.1
Apr.	43.8	24.8	11.1	7.7
May	41.4	22.7	10.9	7.6
June	37.3	19.5	10.1	7.4
July	29.0	14.0	8.7	6.3

Foundry Equipment, Supplies

(In thousands of dollars)

	Shipments	Orders	Back-logs
1943	53,806	32,094	.....
May	4,718	1,774	10,513
June	4,825	2,319	9,017
July	4,017	2,405	8,345
Aug.	3,513	1,989	7,429
Sept.	3,881	2,070	6,930
Oct.	3,792	3,401	7,092
Nov.	3,563	3,422	7,076
Dec.	3,217	3,786	7,731
1944	41,914	44,903	.....
Jan.	3,336	3,515	7,910
Feb.	3,426	4,388	8,822
Mar.	3,679	4,370	9,513
Apr.	3,496	2,424	8,441
May	3,547	4,089	8,983
June	3,554	3,906	9,335
July	3,027	3,086	9,394
Aug.	3,818	4,115	9,691
Sept.	3,445	3,465	9,711
Oct.	3,758	4,293	10,246
Nov.	3,451	3,401	10,196
Dec.	3,377	3,912	10,731
1945			
Jan.	3,355	3,631	11,007
Feb.	3,548	4,103	11,562
Mar.	3,804	5,247	13,005
Apr.	3,685	2,678	11,997
May	3,741	3,778	12,034
June	3,724	3,399	11,709

Magnesium Casting Shipments

(In thousands of pounds)

	Total	Sand	Perm. Mold	Die
1943	65,967	59,123	3,978	2,866
June	4,690	4,159	296	235
July	4,940	4,406	290	244
Aug.	5,238	4,770	257	211
Sept.	6,008	5,391	390	227
Oct.	6,774	6,096	431	247
Nov.	6,792	6,068	452	272
Dec.	6,840	6,220	382	238
1944	83,979	75,221	6,396	2,362
Jan.	6,984	6,210	536	238
Feb.	7,293	6,603	469	221
Mar.	8,242	7,574	496	172
Apr.	7,520	6,922	413	185
May	7,357	6,664	514	179
June	6,535	5,729	598	208
July	6,481	5,653	656	172
Aug.	6,934	6,143	563	228
Sept.	6,945	6,147	606	192
Oct.	6,738	6,062	515	161
Nov.	6,639	5,919	521	199
Dec.	6,315	5,595	509	207
1945				
Jan.	7,005	6,149	609	247
Feb.	6,707	5,832	658	217
Mar.	7,664	6,700	683	281
Apr.	7,053	6,257	614	182
May	6,794	6,081	525	188
June	5,521	4,878	429	214
July	4,415	3,949	266	200

GRAY IRON CASTINGS—Production, Shipments and Unfilled Orders in Tons

1944	Production	Shipments	Unfilled Orders
March	840,890	828,648	2,184,268
April	765,784	757,880	2,159,280
May	789,007	790,674	2,204,572
June	765,581	763,459	2,213,183
July	698,418	689,744	2,313,645
Aug.	778,388	778,205	2,335,194
Sept.	768,661	744,954	2,304,323
Oct.	788,196	780,453	2,296,690
Nov.	769,734	760,383	2,300,350
Dec.	743,710	741,534	2,474,548
Totals	9,275,017	9,165,726	.....
1945			
Jan.	807,130	791,895	2,496,928
Feb.	752,935	752,266	2,562,076
Mar.	830,853	857,816	2,713,656
Apr.	768,588	773,988	2,640,642
May	806,297	798,055	2,602,986
June	772,761	781,935	2,596,012
July	693,257	689,711	2,564,973

By Type—Latest Months Reported

	Production	Shipments Total	Shipments For Sale	Unfilled Orders Total	Unfilled Orders For Sale	Unfilled Orders For Own Use
July, 1945						
Total	693,257	689,711	429,100	2,564,973	1,811,659	753,314
Pressure pipe, fittings	47,920	48,678	46,409	182,030	176,752	5,278
Soil pipe, fittings	12,480	13,021	13,021	174,688	174,688	.....
Chilled car wheels	73,895	74,240	69,383	246,356	232,719	13,637
Molds for steel ingots	159,687	155,387	77,154	294,465	160,517	133,948
All other gray iron	399,275	398,385	223,133	1,667,434	1,066,983	600,451
June, 1945						
Total	772,761	781,935	496,662	2,596,012	1,810,609	785,403
Pressure pipe, fittings	52,847	58,847	53,758	163,196	157,808	5,388
Soil pipe, fittings	12,638	13,093	13,093	165,656	165,656	.....
Chilled car wheels	81,563	79,962	75,146	242,556	227,819	14,737
Molds for steel ingots	165,311	166,804	84,608	329,878	179,984	149,894
All other gray iron	460,402	463,227	268,035	1,694,726	1,079,342	615,384

WPB figures reported by Bureau of the Census